### Framing

#### My value is Morality – it’s intrinsically valuable and all other values collapse.

#### My value criterion is maximizing expected well-being. This is preferable:

#### 1. Only pleasure and pain are intrinsically valuable – all other frameworks collapse.

Moen 16 [Ole Martin Moen, Research Fellow in Philosophy at University of Oslo “An Argument for Hedonism” Journal of Value Inquiry (Springer), 50 (2) 2016: 267–281]

Let us start by observing, empirically, that a widely shared judgment about intrinsic value and disvalue is that pleasure is intrinsically valuable and pain is intrinsically disvaluable. On virtually any proposed list of intrinsic values and disvalues (we will look at some of them below), pleasure is included among the intrinsic values and pain among the intrinsic disvalues. This inclusion makes intuitive sense, moreover, for there is something undeniably good about the way pleasure feels and something undeniably bad about the way pain feels, and neither the goodness of pleasure nor the badness of pain seems to be exhausted by the further effects that these experiences might have. “Pleasure” and “pain” are here understood inclusively, as encompassing anything hedonically positive and anything hedonically negative.2 The special value statuses of pleasure and pain are manifested in how we treat these experiences in our everyday reasoning about values. If you tell me that you are heading for the convenience store, I might ask: “What for?” This is a reasonable question, for when you go to the convenience store you usually do so, not merely for the sake of going to the convenience store, but for the sake of achieving something further that you deem to be valuable. You might answer, for example: “To buy soda.” This answer makes sense, for soda is a nice thing and you can get it at the convenience store. I might further inquire, however: “What is buying the soda good for?” This further question can also be a reasonable one, for it need not be obvious why you want the soda. You might answer: “Well, I want it for the pleasure of drinking it.” If I then proceed by asking “But what is the pleasure of drinking the soda good for?” the discussion is likely to reach an awkward end. The reason is that the pleasure is not good for anything further; it is simply that for which going to the convenience store and buying the soda is good.3 As Aristotle observes: “We never ask [a man] what his end is in being pleased, because we assume that pleasure is choice worthy in itself.”4 Presumably, a similar story can be told in the case of pains, for if someone says “This is painful!” we never respond by asking: “And why is that a problem?” We take for granted that if something is painful, we have a sufficient explanation of why it is bad. If we are onto something in our everyday reasoning about values, it seems that pleasure and pain are both places where we reach the end of the line in matters of value.

#### 2. State actors must default to utilitarianism – trade-offs and community defense

Nyamutata 20 (Conrad, Lecturer in Law, Faculty of Business and Law, De Montfort University, Leicester, UK “Do Civil Liberties Really Matter During Pandemics?”, international human rights law review 9 (2020) 62-98)

The protection of individual rights should be part of any policy. Public health management, however, attempts to balance potentially conflicting individual and community interests. In this paper, I attempted to provide an overview of the responses of states to covid-19 against tenets of human rights law. The article sought to answer the question whether human rights matter in pandemics. The outbreak of covid-19 invited some the most stringent measures. What the article has shown is two models were applied across the political spaces of affected countries: the authoritarian model and the illiberal approach. Authoritarian approaches were tolerated while illiberal measures of public health management were permissible, the latter, in countries with longstanding democratic cultures. While the authoritarian model would be too extreme, it is evident from the responses to covid-19 that even Western states adopted a semi-autocratic model with extensive limitations of individual liberties. Given the pattern of jurisprudence on disease outbreaks, it is plausible to conclude that public health responses barely accommodate individual rights or of private concerns. These measures are founded on the premise that, in emergency situations, the enjoyment of individual human rights and civil liberties may have to be limited excessively in the public interest. The rhetoric of inalienability of rights becomes hollow as the states mimic authoritarian regimes. On the other hand, because of the fear generated by pandemics, citizens generally acquiesce to draconian rule. Given the success in China in controlling covid-19, discussions have even gone as far as whether the authoritarian model is the ideal response to pandemics.

#### Liberties are only important because of their consequences

Freiman 18 (Christopher, Class of 1963 Distinguished Term Associate Professor of Philosophy at William & Mary. , “AFFIRMATIVE: Freedom Is a Means to a Happier World”, https://reason.com/2018/09/09/proposition-the-best-case-for/)

Don't get me wrong—rights are important. But they're important because they're beneficial. Private property, free trade, and civil liberties are valuable as means to a prosperous, peaceful, and happy world. Adam Smith tells us that market exchange is good because it's mutually beneficial. What's more, as F.A. Hayek showed, market prices convey information that enables economies to allocate resources efficiently. And robust protection for market liberties functions as a safeguard against government overreach—a state with limited regulatory and redistributive powers is a much less valuable prize for "rent seekers." To get rich in a place with a minimal state, you can't lobby the government for subsidies or for regulations that drive your competition out of business; instead, you'll need to make better and cheaper products that help stretch everyone's paycheck.

### 1

#### Counterplan: The member states of the world trade organization except for the United States ought to reduce intellectual property protections for medicines, and the World trade organization ought to increase US intellectual property protections.

#### Without IP there is no incentive for anyone in America to work towards the production of medicines

GIPC 19

Global Innovation Policy Center 2019 “A New Congress Must Prioritize Intellectual Property” https://www.theglobalipcenter.com/a-new-congress-must-prioritize-intellectual-property/

The 2018 election was certainly exciting, focusing on many key issues for Americans including the economy, healthcare, and jobs. Record numbers of voters throughout the country voiced their opinions by heading to the polls, and the newly-elected Congress will hit now the ground running on January 3, 2019. As Members, new and tenured, begin to frame their priorities for the next few years, it’s critical they keep intellectual property (IP) rights top of mind. IP is critical to nearly every aspect of our lives, and it’s the bedrock of innovation. It’s present in every industry, crucial to every American business, and it advances global economic and cultural prosperity. In the U.S. alone, IP-intensive industries employ more than 40 million Americans and account for 74 percent of exports and $5.8 trillion in GDP. Importantly, the average worker in an IP industry earns about 46 percent more than his or her counterpart in a non-IP industry. It doesn’t matter whether it’s Silicon Valley, the Texas oil fields, or the South Carolina craft beer industry, all companies rely upon IP frameworks and the assurance of patents, trademarks, and copyrights to create businesses and bolster domestic employment. Members of Congress looking for their state-specific IP employment data can find it in our [Employing Innovation Across America](https://www.theglobalipcenter.com/ip-employs-innovation/) study. IP is also critical to the breakthrough solutions that keep us healthy and make our lives easier. The U.S leads the world in research and development and continuously discovers new medicines, technologies, and equipment. The pharmaceutical industry, in particular, has pioneered cutting-edge treatment options and life-saving medicines. One example is UC San Diego Moores Cancer Center’s recent partnership with the La Jolla Institute of Allergy and Immunology to test a vaccine that specifically targets cancer cells. This feat wouldn’t be possible if our lawmakers and representatives didn’t consistently promote an IP environment that fosters innovation and incentivizes risk-takers. Beyond job creation and research and development, we rely on IP for consumer safety. Strong IP rights protect consumers, inventors, and manufacturers alike, and hold bad actors accountable. Recent trends show a new era of counterfeits, especially online, pose serious threats to American consumers. No longer limited to footwear, accessories, and apparel, illicit operations sell falsified products ranging from cosmetics to auto parts, electronics, and beyond. While lower prices can often seem appealing to consumers, these products are made without any quality or safety assurance. Accordingly, we’ve all seen reports of malfunctioning automotive parts, exploding electronics, cosmetics that cause skin reactions, and pharmaceuticals with toxic ingredients. Properly enforced IP rights are the only way to ensure that the products consumers buy are authentic and safe and promise confidence and reliability. Globally, America leads the world in [IP standard](https://www.theglobalipcenter.com/ipindex2018/), and it’s imperative we remain an IP leader that other countries can look to. During the 116th Congress, lawmakers will be presented with opportunities to not only bolster domestic IP law, but also international IP frameworks with many of our trading partners – and they must capitalize. As trade deal negotiations continue throughout 2019, most immediately the United States-Mexico-Canada-Agreement (USMCA), Congress should prioritize high-standard IP provisions that better represent modern economies and support global innovation. The political discourse has grown to be increasingly heated, but IP can serve as a bipartisan and unifying force for Members spanning both ends of the political spectrum. More than ever, Congress should work together to reach consensus agreements that safeguard IP and fuel American innovation.

#### The US funds world innovation by producing the most cutting edge drugs and selling them at lower prices

Ryan Huber, 3-29-2017, "U.S. Health Care Reality Check #1: Pharmaceutical Innovation," Medium, https://medium.com/arc-digital/u-s-health-care-reality-check-1-pharmaceutical-innovation-574241fb80ba

There are several important reasons why health care is so expensive in the United States, and Grossman points out perhaps the most important: the United States effectively subsidizes research and development of drugs and medical devices for the rest of the world. As Grossman notes, other advanced nations “clamp down” on the profit motive in various ways, meaning that people who would normally make more money in a free market through developing new medical devices, medications, or procedures to produce better health care outcomes and perhaps drive down prices through competition have less incentive to do so in these more government-controlled health care systems. That is, despite the many regulations and laws aimed at consumer protection and safety that do exist in the United States, our health care market is relatively freer and more dynamic than those of other developed countries. This leads to a high rate of medical and pharmaceutical innovation that ends up benefiting the rest of the world, particularly other rich countries, in a similar way that NATO nations, for example, benefit from close military alliance with the United States. In short and somewhat reductive terms: we spend more money so everyone else can be healthier. But this doesn’t make total sense at first. If the United States is developing more innovative medicines, devices, and procedures than every other advanced economy, why aren’t we making money by selling these medical innovations to others for a hefty profit? Why aren’t there many more billions of dollars of revenue coming into the United States Treasury because of our status as a medical innovator? The answer is complicated, but here are some facts you need to know: First, pharmaceutical companies which innovate in the United States charge their domestic customers much more than they do their customers abroad. This is because, if countries don’t like the prices charged by a given pharmaceutical company for a certain drug, [they will simply ignore the patent](http://www.economist.com/blogs/schumpeter/2013/04/drug-patents) that company holds for their drug in the United States or elsewhere. Novartis spent nearly 15 years seeking a patent in India for Glivec, a medicine for chronic myeloid leukemia. That quest reached its dead end, at last. India’s [Supreme Court](http://supremecourtofindia.nic.in/outtoday/patent.pdf) rejected the Swiss drugmaker’s patent application. Glivec (marketed in America as “Gleevec”) is a blockbuster, earning the Swiss drugmaker [$4.7 billion](http://www.novartis.com/downloads/investors/reports/novartis-annual-report-2012-en.pdf) last year. Its prospects in India are now zilch. Although in this example Novartis happens to be a Swiss drug company, the ruling sends the same clear message to drug makers in the United States: Give us your drugs for next to nothing or you’ll get exactly nothing. Second, and relatedly, notice that there seems to be a correlation between how much a country spends on prescription drugs and the percentage of NMEs (New Molecular Entities) produced by that country. If you combine points 1 and 2, you start to understand that the high spending of health care consumers in the United States is arguably funding not only global pharmaceutical innovation but is also facilitating the availability of new medicines to other countries at much lower prices than domestic consumers pay. There is a third factor that might help explain why health care, especially with regard to pharmaceutical innovation, is so much more expensive in the United States: our massive regulatory agency of all things drugs and food, also known as the FDA, is significantly more burdensome for medical innovation than the analogous agency for all of Europe, the EMA (European Medicines Agency). The EMA doesn’t get the final say on whether a drug gets approved for sale in the EU, and perhaps even more significantly, they don’t breathe down their drug companies’ necks during clinical trials. It’s understandable that, given limited resources, the regulatory process can’t be automatic, or even fast-tracked, for all applicants. But if the FDA can put a medication on a path where an evaluation can be made “quickly and efficiently,” does that mean the normal course of action is to proceed slowly and inefficiently? If so, this could represent a needless driver of health care costs. We need to be able to ask this question: Is there something going wrong with the drug development process to have the costs so high and climbing higher every year? Looking at a cost breakdown of Big Pharma companies from 2014, a big chunk of their costs, almost equal to the sum of the entire first and second phase of their clinical trials, come from the 4th phase of clinical trials, which is often referred to as “post-marketing surveillance.” This is the phase of a drug’s life that takes place after its approval for sale on the U.S. market, in which the FDA requires continued and ongoing studies to validate the drug’s safety and efficacy using data generated from every phase of clinical trials leading up to its approval in the first place. It’s in this phase of a drug’s life where, after spending large amounts of money to get the drug approved, companies can still watch as the FDA rescinds a drug’s approval status, which leads to the drug getting withdrawn from the market, in many cases never to be seen again. So, not only is almost a fourth of a drug’s average R & D cost attributable to legislative constraints the government imposes on pharmaceutical companies to police their own products even after they’ve been approved based on incredibly high standards of safety and testing, but also, compared to less developed countries, we’re more likely to pull drugs off the market and revoke their status as a result of anecdotal case reports of adverse effects that generally go unverified. We consistently decide to err on the side of safety, even if it means pulling the plug on a 10–15-year-long investment (the average length of development for a drug), which helps clarify how aspiring for safer and more effective drugs begins to preclude cheaper drugs. So the United States produces the most novel and cutting edge therapeutic compounds despite the most expensive and stringent approval process and sells them to other countries at much lower prices than we do at home. In doing this, we are indeed subsidizing research and development of drugs and medical devices for the rest of the world. This subsidized medical innovation is a major contributing factor to the out-of-control health care costs in the United States, and losing this innovation will be one of the sacrifices we make if we move toward a more cost-controlled or government-run health care system over the next several years.

#### The U.S. is the most important state for innovation of non-molecular entities that means their uniquely k2 innovation

[Keyhani](https://www.ncbi.nlm.nih.gov/pubmed/?term=Keyhani%20S%5BAuthor%5D&cauthor=true&cauthor_uid=20403883) et al 10

[Salomeh Keyhani](https://www.ncbi.nlm.nih.gov/pubmed/?term=Keyhani%20S%5BAuthor%5D&cauthor=true&cauthor_uid=20403883), MD, MPH,corresponding author [Steven Wang](https://www.ncbi.nlm.nih.gov/pubmed/?term=Wang%20S%5BAuthor%5D&cauthor=true&cauthor_uid=20403883), MD, [Paul Hebert](https://www.ncbi.nlm.nih.gov/pubmed/?term=Hebert%20P%5BAuthor%5D&cauthor=true&cauthor_uid=20403883), PhD, [Daniel Carpenter](https://www.ncbi.nlm.nih.gov/pubmed/?term=Carpenter%20D%5BAuthor%5D&cauthor=true&cauthor_uid=20403883), PhD, and [Gerard Anderson](https://www.ncbi.nlm.nih.gov/pubmed/?term=Anderson%20G%5BAuthor%5D&cauthor=true&cauthor_uid=20403883), PhD, June 2010, “US Pharmaceutical Innovation in an International Context” https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/

Thirty-six percent of all NMEs were developed in the United States ([Figure 1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig1/)). The United Kingdom was the next largest source of NME development (10.4%). Examination of drugs with patents (n = 288) revealed that 126 (43.7%) of the NMEs had their earliest patent filed by inventors in the United States. Of the 288 drugs with patents in force at the time of FDA approval, 28 (10%) had more than 1 country listed as the home country of the patent holder. The distribution of inventor countries did not appreciably change if we assigned the second country listed on the patent as the inventor (data not shown).

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[Open in a separate window](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig1/?report=objectonly) [FIGURE 1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig1/) Source of pharmaceutical innovation classified by location of the company headquarters by (a) country of the inventor and (b) patent assignees: 1992–2004. Note. Data based on drugs approved between 1992 and 2004. The sample size was N = 346. Other includes Denmark, Spain, Norway, Austria, Korea, Czechoslovakia, and Australia. Percentages do not add up to 100% because of rounding, Innovation as a Function of Company Location Overall, 171 companies were listed as the assignees for 288 NMEs with patents. Examination of the patents revealed that 33% of the assignees had company headquarters located in the United States, and 10% had company headquarters in the United Kingdom ([Figure 1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig1/)). However, further examination showed that most companies were multinationals with facilities located in 2 or more countries ([Figure 2](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig2/)).

[Open in a separate window](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig2/?report=objectonly) [FIGURE 2](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig2/) Pharmaceutical patent assignees, by type of company: 1992–2004. Note. Data based on drugs approved between 1992 and 2004. The sample size was N = 346. Relations With Gross Domestic Product and Prescription Drug Spending The relationship between the proportion of each country's GDP to the total GDP among all countries and the proportion of NME development is shown in [Figure 3](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig3/). Similarly, the relationship between the proportion of each country's prescription drug spending and their respective proportion of NME development is depicted in [Figure 4](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig4/). In both figures, countries above the 45 degree line innovate more in relation to their prescription drug spending and GDP, and countries below the line innovate less. As shown in [Figures 3](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig3/) and [​and4,4](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig4/), the United States accounted for roughly 42% of prescription drug spending and 40% of the GDP among NME innovator countries and was responsible for the development of 43.7% of the NMEs. The US contribution to global discovery of NMEs was roughly proportional to its contribution to global wealth and prescription drug spending. The United Kingdom was responsible for the development of 12.5% of the NMEs and accounted for 4.7% of prescription drug spending and 5.9% of the GDP among innovator countries. In contrast, Japan was responsible for the development of 9.7% of the NMEs and accounted for 18.9% of prescription drug spending and 19.1% of the GDP among innovator countries. Similarly, Switzerland, Belgium, and a few other countries innovated proportionally more than their contribution to the GDP or prescription drug spending and Spain, Korea, Australia, and Italy innovated proportionally less.

[[Chart

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[Open in a separate window](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig3/?report=objectonly) [FIGURE 3](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig3/) Pharmaceutical innovation as a function of gross domestic product (N = 288): 2000. Note. GDP = gross domestic product; NME = new molecular entity. Axes are on a log scale. The United States almost falls on the 45 degree line where contribution to GDP and NME development is roughly proportional. Countries above the line develop a higher percentage of drugs compared with their percentage contribution to GDP. For example, the United States accounted for 40% of the GDP among NME innovator countries and was responsible for the development of 43.7% of the NMEs. The UK contributed proportionally more NMEs than its national income would indicate, and Australia and Japan proportionally less.

[Open in a separate window](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig4/?report=objectonly) [FIGURE 4](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/figure/fig4/) Pharmaceutical innovation (development of NMEs) as a function of prescription drug spending (N = 288): 2000. Note. NME = new molecular entity. Axes are on a log scale. Countries above the line develop a higher percentage of drugs compared with their percentage contribution to prescription drug spending. [Go to:](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/) DISCUSSION Pharmaceutical innovation is an international enterprise. Although the United States is an important contributor to pharmaceutical innovation, we found that more than 20 countries contributed to the development of the 288 NMEs with patents at the time of approval. More than 171 companies were involved in the development of these NMEs, and the vast majority of companies were multinationals with facilities located in more than 2 countries. We also found that the United Kingdom, Switzerland, Belgium, and a few other countries innovated proportionally more than their contribution to the global GDP or prescription drug spending, whereas Japan, Spain, Australia, and Italy innovated less. In contrast with the United States, all other countries investigated had instituted at least 1 form of drug pricing regulation.[1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib1) Critics of drug price regulation argue that free market pricing strategies and higher prices in the United States are instrumental to innovation.[20](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib20),[21](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib21) One might therefore expect the United States to be the most innovative given that it is the only country with a predominantly unregulated pharmaceutical market. However, US pharmaceutical innovation appeared to be roughly proportional to its national wealth and prescription drug spending. Our data suggest that the United States is important but not disproportionate in its contribution to pharmaceutical innovation. Interestingly, some countries with direct price control, profit control, or reference drug pricing appeared to innovate proportionally more than their contribution to the global GDP or prescription drug spending. There are 3 general types of price regulation strategies that are implemented in OECD countries: (1) direct control of prices, (2) reference pricing and generic substitution, and (3) profit control (an indirect form of price control in which a country limits the profits generated by a company within its territory).[20](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib20),[22](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib22) The United Kingdom, Spain, and South Korea[1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib1) use profit control to lower drug costs.[23](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib23) Canada uses a mixture of measures to control drug prices in different provinces.[24](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib24) Denmark, Germany, the Netherlands, Italy, Norway, Spain have all implemented a form of reference drug pricing.[1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib1) Belgium, Switzerland, Sweden, Italy, Austria, and Finland set the manufacturer price, the reimbursement price, or both.[1](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib1) Although many researchers[20](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib20),[21](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib21),[25](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib25) have speculated that reference drug pricing in the United States would have dire consequences for innovation, our data suggest that the pharmaceutical innovation of countries with reference drug pricing is more or less what one would expect given their prescription drug spending or even the general size of their economies. Many countries with significant price regulation were important innovators of pharmaceuticals; therefore, our data suggest that country-specific pricing policies probably do not affect country-specific innovation. For example, although prices in the United Kingdom are much less than are prices in the United States, the industry continues to be very profitable and innovative.[11](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib11) In Canada, income from domestic sales of brand name companies is, on average, about 10 times greater than is research and development costs, even in the face of prices that are approximately 40% lower than in the United States.[11](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib11) In addition, companies in the United Kingdom invest proportionately more revenue from domestic sales into research and development activity than do their US counterparts.[11](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib11) Despite the above average profitability of US-based companies,[26](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib26) the higher prices paid by US consumers are not rewarded by more than expected domestic innovation. US consumers pay disproportionately higher prices for brand name drugs,[6](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2866602/#bib6) but the United States is not disproportionately innovative.

### DA

#### Biotech is the new frontier; America is ahead but China is dangerously close

Gupta 6/11 [Gaurav Gupta, Biotech Investor, Founder of Ascendant BioCapital, a life science investment firm based in New York. Previously, Gaurav worked at OrbiMed Advisors, and served as a resident in neurological surgery at Columbia University Medical Center. He has co-authored over a dozen articles in peer-reviewed journals, filed a patent on a device for use in spine surgery, and edited a book on the technical and ethical implications of using tissue engineered products in the operating room. Dr. Gupta obtained his M.D. from the Stanford University School of Medicine, where he was a Paul and Daisy Soros Fellow, and B.S. and M.S.E. in biomedical engineering from Johns Hopkins University, where he was a Charles R. Westgate Scholar.) “As Washington Ties Pharma’s Hands, China Is Leaping Ahead” Barron’s Magazine: Commentary, China., 6/11/2021] RM

There should be no doubt that we are living at the dawn of a golden age of biomedical innovation. The American scientific engine that produced Covid-19 vaccines in record time was fueled by a convergence of advances in genomics, biomarkers, data science, and manufacturing years in the making. The first Food and Drug Administration approvals of a host of new product formats—oligonucleotide, bispecific, oncolytic virus, CAR-T, and lentivirus/AAV—all took place within the last decade. These represent an unprecedented expansion of the armamentarium that physicians have at their disposal to treat and cure disease. In the last few years, [47% of all new medicines](https://www.efpia.eu/media/554521/efpia_pharmafigures_2020_web.pdf) were invented by U.S. biopharma companies, with [homegrown startups](https://www.cbo.gov/publication/57126) driving the majority of innovation. The bulk of the remainder were developed by foreign companies specifically for the U.S. market.

An indirect benefit of these trends is that most novel therapeutics undergo clinical development and early commercial launch here in the U.S. The rest of the world understands that the American patient has earlier and broader access to groundbreaking therapies via these mechanisms. Indeed, the past decade is filled with examples of medical “firsts” for American patients: the first cure for Hepatitis C, the first gene therapy for blindness, the first immunotherapy for cancer. Future rewards will be greater still if we preserve our current system of incentivizing and protecting innovation.

The remarkable innovation capacity of our biopharmaceutical industry ought to be a source of national pride. Yet while “Made in America” is the global standard for medicines in development today, misguided policy risks ceding our scientific prowess to other countries in the future. This is particularly true in the case of China, where biotechnology has become a strategic pillar for the health of its people and economy.

From 2016 to 2020, the market capitalization of all Chinese biopharma companies increased exponentially from [$1 billion to over $200 billion](https://www.bloomberg.com/news/articles/2021-03-01/xi-mobilizes-china-for-tech-revolution-to-cut-dependence-on-west). China saw over [$28 billion](https://www.bioworld.com/articles/506978-china-sees-five-year-highs-in-life-sciences-investments-and-partnering) invested in its life sciences sector in 2020, double the previous year’s amount. Returns on China’s investment are already arriving. The FDA approved a drug developed in China for the first time ever in 2019. While China’s innovation capacity currently remains behind America’s, my experiences as a biopharma professional make it clear they are doing everything they can to catch up and catch up fast.

In fact, when I speak to Chinese biotechnology executives, they boast that they can run clinical trials faster than their U.S. counterparts. The danger of misguided policies that disincentivize pharmaceutical innovation in the U.S. is effectively driving that same innovation to China. If we close off the market in the U.S. at the same time that China is opening its market to innovative new products, then we will see companies choose to first launch impactful novel medicines in China, based on clinical trials conducted in China. Because the FDA rarely accepts data generated entirely outside the U.S., this relocation of research capacity will negatively affect Americans’ access to cutting-edge therapies.

The biotechnology field is advancing rapidly. Promising technologies such as targeted protein degradation and gene editing are perhaps not far from being developed into impactful medicines, and the U.S. risks these technologies being mastered by Chinese companies.

It is widely held that allowing China to gain an asymmetric edge in critical technologies such as AI or quantum computing could destabilize the geopolitical balance of power. The same is true of biotechnology. Chinese scientists were the first to edit the genomes of human embryos, in [contravention](https://www.sciencemag.org/news/2019/12/chinese-scientist-who-produced-genetically-altered-babies-sentenced-3-years-jail) of international standards, and the U.S. national security community believes China is [pushing ahead](https://www.nbcnews.com/politics/national-security/china-has-done-human-testing-create-biologically-enhanced-super-soldiers-n1249914) with experimental concepts for biological and cognitive enhancement of soldiers and civilians. American policy should be focused on protecting, rather than undermining, the global dominance of our biotechnology industry.

#### The plan recapitulates IP to China, destroying competitive advantages

WSJ 5/6 [Wall Street Journal Editorial Board, WSJ Opinion Philosophy: “We speak for free markets and free people, the principles, if you will, marked in the watershed year of 1776 by Thomas Jefferson's Declaration of Independence and Adam Smith's “Wealth of Nations.” So over the past century and into the next, the Journal stands for free trade and sound money; against confiscatory taxation and the ukases of kings and other collectivists; and for individual autonomy against dictators, bullies and even the tempers of momentary majorities.” Edited by Paul A. Gigot and Daniel Henninger, “Biden’s Vaccine IP Debacle: His patent heist is a blow to the Covid fight and U.S. biotech.” The WSJ Opinion: Review and Outlook, May 6, 2021] RM

We’ve already criticized President Biden’s bewildering decision Wednesday to endorse a patent waiver for Covid vaccines and therapies. But upon more reflection this may be the single worst presidential economic decision since Nixon’s wage-and-price controls.

In one fell swoop he has destroyed tens of billions of dollars in U.S. intellectual property, set a destructive precedent that will reduce pharmaceutical investment, and surrendered America’s advantage in biotech, a key growth industry of the future. Handed an American triumph of innovation and a great soft-power opportunity, Mr. Biden throws it all away.

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India and South Africa have been pushing to suspend patents at the World Trade Organization for months. They claim that waiving IP protections for Covid vaccines and therapies is necessary to expand global access, but their motivation is patently self-interested.

Both are large producers of generic drugs, though they have less expertise and capacity to make complex biologics like mRNA vaccines. They want to force Western pharmaceutical companies to hand over IP free of charge so they can produce and export vaccines and therapies for profit. Their strategy has been to shame Western leaders into surrendering with the help of Democrats in the U.S.

But suspending IP isn’t necessary to expand supply and will impede safe vaccine production. The global vaccine supply is already increasing rapidly thanks to licensing agreements the vaccine makers have made with manufacturers around the world.

Pfizer and BioNTech this week said they aimed to deliver three billion doses this year, up from last summer’s 1.2 billion estimate. Moderna increased its supply forecast for this year to between 800 million and a billion from 600 million. AstraZeneca says it has built a supply network with 25 manufacturing organizations in 15 countries to produce three billion doses this year.

AstraZeneca and Novavax have leaned heavily on manufacturers in India to produce billions of doses reserved for lower-income countries. But India has restricted vaccine exports to supply its own population. IP simply isn’t restraining vaccine production.

Busting patents also won’t speed up production, since it would take months for these countries to set up new facilities. Competition will increase for scarce ingredients, and less efficient manufacturers with little expertise would make it harder for licensed partners to produce vaccines.

There’s also the problem of safety. Johnson & Johnson has experienced quality problems at an Emergent plant making its vaccines, and that’s in Baltimore. Imagine the potential problems with unlicensed producers in, say, Malaysia or Brazil. If vaccines made there have complications, confidence in licensed vaccines could plummet too. And who would Pfizer and Moderna sue to get their reputations back?

The economic self-damage is also hard to fathom. The U.S. currently has a competitive advantage in biotech and biologics manufacturing, which could be a growing export industry. Waiving IP protections for Covid vaccines and medicines will give away America’s crown pharmaceutical jewels and make the U.S. and world more reliant on India and China for pharmaceuticals.

Moderna has been working on mRNA vaccines for a decade. Covid represents its first success. Ditto for Novavax, which has been at it for three decades. Small biotech companies in the U.S. have been studying how to create vaccines using nasal sprays, pills and patches.

Thanks to Mr. Biden, all this could become the property of foreign governments. Licensing agreements allow developers to share their IP while maintaining quality control. Breaking patents and forcing tech transfers will enable China and low-income countries to manufacture U.S. biotech products on their own.

China’s current crop of vaccines are far less effective than those in the West, but soon Beijing might be able to purvey Pfizer knock-offs. The U.S. has spent years deploring China’s theft of American IP, and now the Biden Administration may voluntarily let China could reap profits from decades of American innovation.

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Instead of handing over American IP to the world, Mr. Biden could negotiate bilateral vaccine agreements and export excess U.S. supply. If Mr. Biden wants to increase global supply safely, the U.S. could spend more to help the companies produce more for export. Then the jobs would go to Americans. We thought this was the point of the production deal Mr. Biden negotiated between J&J and Merck.

Alas, this President seems to be paying more attention these days to Elizabeth Warren, Bernie Sanders, Alexandria Ocasio-Cortez and Nancy Pelosi. They think vaccines and new drugs can be conjured by government as a public good with no incentive for risk-taking or profit. This really is destructive socialism.

Mr. Biden ought to listen to Angela Merkel. Pfizer’s partner BioNTech is a German firm, and the German Chancellor said Thursday that she opposes the WTO heist: “The protection of intellectual property is a source of innovation and it must remain so in the future.”

At least IP is safe in Germany. Mr. Biden has sent a signal around the world that nobody’s intellectual property is safe in America.

#### China biotech heg causes a laundry list of impacts

Moore 19 Scott Moore - Director of the Penn Global China Program at the University of Pennsylvania, Young Professional and Water Resources Management Specialist at the World Bank Group, and Environment, Science, Technology, and Health Officer for China at the U.S. Department of State, Giorgio Ruffolo Post-Doctoral Research Fellow with the Belfer Center for Science and International Affairs at Harvard University, Truman, Fulbright, and Rhodes Scholar., Foreign Policy, "China's Genetic Experiments Are Pushing Ethical Limits", NOVEMBER 8, 2019, 2:53 PM, https://foreignpolicy.com/2019/11/08/cloning-crispr-he-jiankui-china-biotech-boom-could-transform-lives-destroy-them/ - BD

When James Clapper, the U.S. director of national intelligence at the time, appeared before Congress in early January 2016 for an annual briefing of threats to the United States, he didn’t lack for material. Just a few weeks earlier, North Korea had tested a nuclear device, and Russia had begun deploying cruise missiles that appeared to violate a crucial arms-control agreement. But to the surprise of many experts, Clapper devoted a good chunk of his time to describing a much more exotic threat: biomedical research. Specifically, Clapper warned, “Research in genome editing conducted by countries with different regulatory or ethical standards than those of Western countries probably increases the risk of the creation of potentially harmful biological agents or products.”

Clapper’s statement didn’t explicitly mention China—but it didn’t need to. As his testimony went on to make clear, while in the 20th century the United States and Soviet Union held the keys to preventing planetary catastrophe, in the 21st the principal players are the United States and China. And while in a previous age keeping Pandora’s box closed meant preventing nuclear war, today it’s about preventing biotech dangers.

In just the past few years, the development of inexpensive gene-editing techniques has democratized biomedical research, producing a biotech bonanza in places such as China and creating a whole new category of security threats in the process, from the use of genetic information to persecute dissidents and minority groups to the development of sophisticated bioweapons.

When it comes to the United States, China, and technology, artificial intelligence tends to grab most of the attention. But policymakers need to come to grips with the even bigger threat of biotechnology—and soon. Fortunately, though, shared concerns about China’s role in biotechnology also provide a rare chance for meaningful and productive engagement in shaping the rules of a new world.

China’s starring role in preventing the 21st century’s biotech perils stems from its skyrocketing investment in biomedical research. Historically, Western countries, and especially the United States, have been the epicenter of research in the life sciences. The United States alone accounted for some 45 percent of biotech and medical patents filed in the 14-year period ending in 2013. But now, thanks to heavy state-backed investment, China is catching up. Economic plans instituted in 2015 call for the biotechnology sector to account for more than 4 percent of China’s total GDP by 2020, and estimates suggest that as of 2018, central, provincial, and local governments had already invested over $100 billion in the life sciences. Chinese venture capital and private equity investment in the life sciences, meanwhile, totaled some $45 billion just from 2015 to 2017.

China has also invested considerable effort in competing with countries like the United States for biotech talent. Of some 7,000 researchers recruited under the Thousand Talents Plan since 2008, more than 1,400 specialized in the life sciences. A leading American geneticist, Harris Lewin, has warned that the United States is “starting to fall behind … the Chinese, who have always been good collaborators, [are] now taking the lead.”

For the United States and other Western countries, China’s growing role in biomedical research is raising plenty of concern. Several Chinese researchers have shown a willingness to ignore ethical and regulatory constraints on genetic research. In 2018, He Jiankui became a poster child for scientific irresponsibility when he announced he had edited the genes of two twins in utero without following basic safety protocols. He reportedly dismissed them as guidelines, not laws.

Yet the reaction at home was not what He had hoped for. His research had been made possible by the relatively lax standards of Chinese universities, even as he had kept the true nature of it secret from many involved – while discussing it with a small group of Western bioethicists and scientists, who stressed their disapproval. It’s not uncommon in China to break the rules and be lauded for the results anyway, whatever the field. For He, though, the vast international attention that came after the story broke cost him his career and possibly his freedom. Chinese media rushed to stress official disapproval of the experiments. Even the overt purpose of the editing – to ensure that the babies, born to HIV+ mothers, enjoyed protection against the virus – turned out to be scientifically weak.

As China’s biotech sector grows, so too do fears that Chinese researchers like He will be more willing to push the limits of both science and ethics than those in the United States. Earlier this year, Chinese researchers recorded another mind-bending milestone when they implanted human genes linked to intelligence into monkey embryos—and then said that the monkeys performed better on memory tests.

The dominance of the party-state in China raises serious concerns around biotechnology, especially because it carries increasingly ethnonationalist tone. When in 2018 Chinese researchers created the world’s first primate clones, for example, they dubbed them Zhong Zhong and Hua Hua, from the term zhonghua meaning “The Chinese Nation”—an oddly jingoistic moniker for a pair of monkeys. Chinese government policies often blur the line between eugenics and education, lumped together as improving the “quality” (suzhi) of the population, which received another stamp of official endorsement following the recent Fourth Plenum. These programs are carried out through the country’s huge so-called family planning bureaucracy—originally established to enforce the one-child policy.

Moreover, Beijing is increasingly extending its formidable social control apparatus into the realm of genetics. While there are considerable restrictions on private firms sharing biomedical data, largely because of an ugly history of popular discrimination against hepatitis carriers, the government has no such restrictions. A New York Times report earlier this year suggested, for example, that Chinese authorities had assembled a vast trove of genetic data on Chinese citizens without their consent, with the Uighur minority group having been specifically targeted.

Beijing’s brand of bio-nationalism also directly threatens the United States. U.S. officials have been warning universities and research institutions that the biotech sector is a focal point for Chinese industrial espionage activities in the United States. And this past August, a senior Defense Department official warned Congress that China’s growing role in pharmaceutical manufacturing could allow it to disrupt deliveries of critical battlefield medicines, or potentially even alter them to harm U.S. forces

Yet the biggest risks posed by biotech, for China, the United States, and other countries, pertain to nonstate actors. A critical feature of modern biotech, in contrast to technology like nuclear weapons, is that it’s cheap and easy to develop. A technique known as CRISPR, which the Chinese researcher He used in his illicit gene-editing work, makes it practical for just about anyone to manipulate the genomes of just about any organism they can lay their hands on. CRISPR makes it much simpler to skirt ethical restrictions and terrifyingly straightforward for terrorist groups to develop fearsome biological weapons.

Researchers have already shown it’s possible to reconstruct the smallpox virus, which was eradicated in the real world in the 1970s, for as little as $200,000 using DNA fragments you can order online. If a terrorist or rogue state were to successfully do so, virtually no one alive would have any resistance to the virus—and most stockpiles of the vaccine were destroyed long ago. There is an organization, the International Gene Synthesis Consortium, that tries to screen suspicious orders for DNA fragments that might be used to build such bioweapons. And while most of the world’s major DNA synthesis firms belong to the consortium, membership is completely voluntary, and there’s also a thriving and entirely unregulated black market—much of it based in China.

All of this means that biosecurity standards in places like China matter more than ever. After all, if a major bioweapon were to be unleashed, it’s unlikely that any major, globally integrated country could escape unharmed. Fortunately, there are growing signs China is open to better regulation of its biotech sector. In February, the Chinese government announced that “high risk” biomedical research would be overseen by the State Council, China’s equivalent of the cabinet—a sign of the concern with which Beijing views incidents like the He Jiankui CRISPR scandal. In a further sign of this concern, in August, the Chinese Communist Party announced the creation of a new committee to advise top leaders on research ethics.

Government worry is matched by growing public concern within China. Opposition to genetically modified organisms is arguably stronger in China than in the West, and health concerns top the list of public issues. Rumors and panics largely center around health issues, especially after a series of vaccination scandals. That means that the government has to walk unusually carefully and offers plenty of scope to build ethical concerns into both law and practice.

There are plenty of issues for U.S.-China cooperation on biotechnology and biosecurity to address. Given China’s role in the He Jiankui scandal, meanwhile, it would make sense to partner with the United States and other countries as part of a new World Health Organization effort to set international guidelines for the use of CRISPR. Another promising area of U.S.-China cooperation, especially in the research community, relates to so-called gene drives, the process of editing genomes and then spreading them through an entire population in just a few generations. Using gene drives to prevent select mosquito species from reproducing, for example, might finally banish the world of debilitating, widespread diseases such as malaria and Zika, while endangered species might be engineered to survive climate change.

Microsoft founder Bill Gates once observed that “The world hasn’t had that many technologies that are both promising and dangerous. … We had nuclear weapons and nuclear energy.” But thanks in large part to the efforts of biomedical researchers in the United States and China, biotechnology is opening a similar Pandora’s box. And while the world has so far avoided nuclear war or conflict, it’s done so largely though efforts by governments, aided by the fact that nuclear technology is extremely difficult and expensive to master.

The new wave of synthetic biology is exactly the opposite: It’s cheap to use and employ. For that very reason, while the U.S., Chinese, and other governments will be critical to dealing with the threat of new technologies, the discussions can’t be limited to nation-states. They’ll also have to gather together individual researchers, institutions, companies, and organizations like the International Gene Synthesis Consortium. When it comes to the risks posed by emerging technologies, Beijing, like Washington, will have to face the limits of its ability to solve the problem on its own.

#### China will leapfrog the US through biotech primacy

Cumbers 20 [John Cumbers, “I am the founder and CEO of SynBioBeta, the leading community of innovators, investors, engineers, and thinkers who share a passion for using synthetic biology to build a better, more sustainable universe. I publish the weekly SynBioBeta Digest, host the SynBioBeta Podcast, and wrote “What’s Your Biostrategy?”, the first book to anticipate how synthetic biology is going to disrupt virtually every industry in the world. I also founded BetaSpace, a space settlement innovation network and community of visionaries, technologists, and investors accelerating the industries needed to sustain human life here and off-planet. I’ve been involved with multiple startups, I am an operating partner and investor at the hard tech investment fund Data Collective, and I'm a former bioengineer at NASA. I earned my PhD in Molecular Biology, Cell Biology, and Biochemistry from Brown University and am originally from the UK.”) “China’s Plan To Beat The U.S. In The Trillion-Dollar Global Bioeconomy” Forbes, 2/3/2020] RM

The report, entitled “Safeguarding the Bioeconomy,” looks at how research and innovation in the life sciences is driving rapid growth in agriculture, biomedical science, information science and computing, energy, and other sectors of the U.S. economy. This economic activity—collectively referred to as the bioeconomy—presents many opportunities to create jobs, improve the quality of life, and continue to drive the U.S. economy as a whole.

The report says that while the U.S. has been a leader in advancements in the biological sciences, other countries are actively investing in and expanding their capabilities in this area—and the U.S.’s lead is beginning to slip.

Four reasons everyone should care about the U.S. bioeconomy

It might be easy for some to dismiss the report out of hand as a bunch of alarmist professors lobbying for more research money. But when you consider all the ways that biotechnology powers the economy and impacts our daily lives, it becomes clear that this is about something more:

The economy: at $1 trillion in value, the U.S. bioeconomy represents hundreds of thousands of quality, high-paying jobs for Americans.

Health & medicine: innovators in the bioeconomy are making next-generation therapies for cancer and diabetes, tackling emerging diseases like Coronavirus, and even increasing human longevity.

Food & farming: biotechnology is not only making agriculture more sustainable, it’s also bringing to market new and improved crops that are more nutritious, more affordable, and more delicious.

The environment: humanity’s health and well-being depend on our ability to stop and reverse climate change, and we can’t do it without biological solutions that treat carbon not as a waste product, but as the starting point for chemicals and materials that today use petroleum.

Considering all this, it doesn’t seem like an overstatement when the report authors say that U.S. competitiveness in the bioeconomy is key to maintaining the economic health and security of the country.

The very real risks to the U.S. bioeconomy

There are many things that can go wrong, causing the U.S. to lose its current edge in the global bioeconomy. Some of these are economic risks, and others present serious national security risks. All of them are related to a failure of our government to act now. Here’s a sampling of the risks to U.S. leadership at the frontiers of tech and bio:

Insufficient government R&D investment. Money for basic research and development builds the foundations of the bioeconomy. We learn, achieve new results, and create new applications. Investments that help develop enabling tools, technologies, and standards have the potential to maintain the U.S. bioeconomy competitive in a global bioeconomy.

Ineffective or inefficient regulations. Regulatory uncertainty stifles creative new approaches that may have unknown paths, long delays, or that might be prohibited by later changes.

Inadequate workforce. The U.S.’s K-12 education system may not prepare students to study STEM subjects at the university and postgraduate level, hindering the quality of workers. A skilled workforce gives U.S. companies the best talent to choose from, and it also encourages international firms to establish research and production facilities here.

Ineffective or inefficient intellectual property protections. Uncertainty over what is patentable could discourage innovators who are considering whether and how to bring their innovations to market. Patent eligibility is also important to venture capitalists and private equity investors when considering whether to invest in biotechnology companies.

Cybersecurity. As biological engineering depends more and more on massive datasets, the emerging bioeconomy now exists at the intersection of information science and biotechnological science. The bioeconomy’s growing reliance on software, networking, and computer hardware tools yields the same cyber vulnerabilities present in any other sector, including hacking, sabotage, breached privacy, or theft of intellectual property.

Biosafety and biosecurity risks. The tools of today’s bioeconomy are enabling new capabilities that can generate concerns regarding traditional biothreats. These can include the accidental or intentional creation or release of dangerous or lethal pathogens. Such biothreats can harm humans, animals, plants, agriculture, the environment, and materials.

Risks from climate change. Food and feed crops, biofuels crops, and crops used with bio-based fermentation products are susceptible to temperature and water stresses, as well as insects and pathogens that migrate with changing weather patterns.

China: the biotech elephant in the room

I’ve written previously written how the Chinese government is already making substantial investments in its bioeconomy. Here are three scary statistics, courtesy of Greg B. Scott of the ChinaBio Group:

China is out-investing the U.S. China’s private investors poured $14.4 billion into its bioeconomy in 2019. That compares to the United States’ more meager investment of $10.4 billion.

China is building a bigger bioeconomy workforce. China graduates about 8-10 million students each year. In the U.S., that number is closer to 400,000. Many Chinese students graduating from U.S. institutions stay here, but they are increasingly returning home to start highly innovative companies.

China is investing in itself. Historically, China has invested heavily in foreign companies, tech, and debt. Now we’re seeing an uptick in China-to-China investments—the country no longer needs to look abroad to find plenty of good biotech opportunities.

Chinese investments have led to centers of excellence in the regional technology hub of Shenzhen, including the Institute of Synthetic Biology at the Shenzhen Institute of Advanced Sciences (SIAT) and BGI Genomics. Shenzhen will compete for technological and economic leadership with U.S. regional biotech powerhouses such as San Francisco/Silicon Valley and Boston/Cambridge in the years to come.

Many of China’s long-standing challenges—environment, food, water, waste management, and rapid innovation to retain its global manufacturing competitiveness—are areas where synthetic biology is seen as a key technology for the future. In other words, synthetic biology is not just an academic pursuit for China. Rather, its leaders are thinking proactively about how biological engineering can be used to address the country’s strategic national interests—while U.S. leadership stands idly by.

What do we do?

So what can U.S. policymakers do to protect the U.S. bioeconomy and ensure continued technological and economic leadership in biology for the next twenty years?

Straight from the top. China has made clear its ambition to become a global tech superpower, with President Xi Jinping calling science and technology one of the main battlefronts of the economy. The U.S. administration needs to step up its game, too. President Trump recently declared January 2020 to be National Biotechnology Month, citing “boundless possibilities for economic growth, national security, healthcare, manufacturing, and agriculture.” That’s the right sentiment—now we need real action.

New legislation. Late last year, the U.S. House of Representatives passed the Engineering Biology Research and Development Act of 2019, which would direct the Office of Science and Technology Policy (OSTP) to implement a national research strategy for engineering biology. The explicit goal: maintain U.S. science, technology, and economic leadership in synthetic biology. The bill now resides in the Senate and awaits committee action. Legislative leadership is now needed to give this bill the appropriations necessary to give it real teeth, and then put it squarely on the President’s desk.

Investing for returns. The Human Genome Project is said to have returned $141 for every dollar invested by taxpayers. While “Big Science” yields tremendous benefits for everyone, it doesn’t happen without federal funding. In 2019, politically courageous Republicans and Democrats came together to produce a 2020 final spending bill that is kind to science, in essence ignoring President Trump’s proposed cuts and instead giving increases to each of the NIH, NSF, NASA, and DOE’s Office of Science. But the U.S. isn’t even in the top ten for R&D spending as a percentage of GDP, while China continues to close in on the U.S., meaning that the U.S. is no longer the uncontested global leader in science.

Leading the global bioeconomy: Have some courage

There are many things the U.S. could do to protect the American bioeconomy. But above all else, policymakers need to come together and demonstrate the kind of courage and vision needed to be a world leader. Science and technology know no partisan lines. Everybody wants healthy lives, clean water, and good jobs. Federal initiative and assistance are needed to bring these benefits to everyone living in the U.S..

Today, the American synthetic biology industry may be unprepared for the global competition it will face, lacking initiative and leadership at the highest levels of government. But this could change quickly. If a country like the U.S. makes engineering biology a national priority, anything is possible in the new bioeconomy.

#### Heg solves arms races, land grabs, rogue states, and great power war

Brands 18 [Hal, Henry Kissinger Distinguished Professor at Johns Hopkins University's School of Advanced International Studies and a senior fellow at the Center for Strategic and Budgetary Assessments." American Grand Strategy in the Age of Trump." Page 129-133]

Since World War II, the United States has had a military second to none. Since the Cold War, America has committed to having overwhelming military primacy. The idea, as George W. Bush declared in 2002, that America must possess “strengths beyond challenge” has featured in every major U.S. strategy document for a quarter century; it has also been reflected in concrete terms.6

From the early 1990s, for example, the United States consistently accounted for around 35 to 45 percent of world defense spending and maintained peerless global power-projection capabilities.7 Perhaps more important, U.S. primacy was also unrivaled in key overseas strategic regions—Europe, East Asia, the Middle East. From thrashing Saddam Hussein’s million-man Iraqi military during Operation Desert Storm, to deploying—with impunity—two carrier strike groups off Taiwan during the China-Taiwan crisis of 1995– 96, Washington has been able to project military power superior to anything a regional rival could employ even on its own geopolitical doorstep.

This military dominance has constituted the hard-power backbone of an ambitious global strategy. After the Cold War, U.S. policymakers committed to averting a return to the unstable multipolarity of earlier eras, and to perpetuating the more favorable unipolar order. They committed to building on the successes of the postwar era by further advancing liberal political values and an open international economy, and to suppressing international scourges such as rogue states, nuclear proliferation, and catastrophic terrorism. And because they recognized that military force remained the ultima ratio regum, they understood the centrality of military preponderance.

Washington would need the military power necessary to underwrite worldwide alliance commitments. It would have to preserve substantial overmatch versus any potential great-power rival. It must be able to answer the sharpest challenges to the international system, such as Saddam’s invasion of Kuwait in 1990 or jihadist extremism after 9/11. Finally, because prevailing global norms generally reflect hard-power realities, America would need the superiority to assure that its own values remained ascendant. It was impolitic to say that U.S. strategy and the international order required “strengths beyond challenge,” but it was not at all inaccurate.

American primacy, moreover, was eminently affordable. At the height of the Cold War, the United States spent over 12 percent of GDP on defense. Since the mid-1990s, the number has usually been between 3 and 4 percent.8 In a historically favorable international environment, Washington could enjoy primacy—and its geopolitical fruits—on the cheap.

Yet U.S. strategy also heeded, at least until recently, the fact that there was a limit to how cheaply that primacy could be had. The American military did shrink significantly during the 1990s, but U.S. officials understood that if Washington cut back too far, its primacy would erode to a point where it ceased to deliver its geopolitical benefits. Alliances would lose credibility; the stability of key regions would be eroded; rivals would be emboldened; international crises would go unaddressed. American primacy was thus like a reasonably priced insurance policy. It required nontrivial expenditures, but protected against far costlier outcomes.9 Washington paid its insurance premiums for two decades after the Cold War. But more recently American primacy and strategic solvency have been imperiled.

THE DARKENING HORIZON For most of the post–Cold War era, the international system was— by historical standards—remarkably benign. Dangers existed, and as the terrorist attacks of September 11, 2001, demonstrated, they could manifest with horrific effect. But for two decades after the Soviet collapse, the world was characterized by remarkably low levels of great-power competition, high levels of security in key theaters such as Europe and East Asia, and the comparative weakness of those “rogue” actors—Iran, Iraq, North Korea, al-Qaeda—who most aggressively challenged American power. During the 1990s, some observers even spoke of a “strategic pause,” the idea being that the end of the Cold War had afforded the United States a respite from normal levels of geopolitical danger and competition. Now, however, the strategic horizon is darkening, due to four factors.

First, great-power military competition is back. The world’s two leading authoritarian powers—China and Russia—are seeking regional hegemony, contesting global norms such as nonaggression and freedom of navigation, and developing the military punch to underwrite these ambitions. Notwithstanding severe economic and demographic problems, Russia has conducted a major military modernization emphasizing nuclear weapons, high-end conventional capabilities, and rapid-deployment and special operations forces— and utilized many of these capabilities in conflicts in Ukraine and Syria.10 China, meanwhile, has carried out a buildup of historic proportions, with constant-dollar defense outlays rising from US$26 billion in 1995 to US$226 billion in 2016.11 Ominously, these expenditures have funded development of power-projection and antiaccess/area denial (A2/AD) tools necessary to threaten China’s neighbors and complicate U.S. intervention on their behalf. Washington has grown accustomed to having a generational military lead; Russian and Chinese modernization efforts are now creating a far more competitive