# 1AC

### 1AC---Innovation Advantage

#### Advantage one is Innovation:

#### The Ninth Circuit’s decision in *FTC v. Qualcomm* permits ICT firms who hold standard-essential patents to engage in exclusionary conduct with antitrust impunity.

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Standards can enhance competition and consumer choice, but they also massively inflate the value of patents deemed essential to the standard, and give their owners the power to sue companies that implement the standard for money damages or injunctions to block them from using their SEPs. When standards cover critical features like wireless connectivity, SEP owners wield a huge amount of “hold-up” power because their patents allow them to effectively block access to the standard altogether. That lets them charge unduly large tolls to anyone who wants to implement the standard.

To minimize that risk, standard-setting organizations typically require companies that want their patented technology incorporated into a standard to promise in advance to license their SEPs to others on fair, reasonable, and non-discriminatory (FRAND) terms. But that promise strikes at a key tension between antitrust and patent law: patent owners have no obligation to let anyone use technology their patent covers, but to get those technologies incorporated into standards, patent owners usually have to promise that they will give permission to anyone who wants to implement the standard as long as they pay a reasonable license fee.

Qualcomm is one of the most important and dominant companies in the history of wireless communication standards. It is a multinational conglomerate that has owned patents on every major wireless communication standard since its first CDMA patent in 1985, and it participates in the standard-setting organizations that define those standards. Qualcomm is somewhat unique in that it not only licenses SEPs, but also supplies the modem chips used by a wide range of devices. These include chips that implement wireless communication standards, which lie at the heart of every mobile computing device.

Although Qualcomm promised to license its SEPs (including patents essential to CDMA, 3G, 4G, and 5G) on FRAND terms, its conduct has to many looked unfair, unreasonable, and highly discriminatory. In particular, Qualcomm has drawn scrutiny for bundling tens of thousands of patents together—including many that are not standard-essential—and offering portfolio-only licenses no matter what licensees actually want or need; refusing to sell modem chips to anyone without a SEP license and threatening to withhold chips from companies trying to negotiate different license terms; refusing to license anyone other than original-equipment manufacturers (OEMs); and insisting on royalties calculated as a percentage of the sale price of a handset sold to end users for hundreds of dollars, despite the minimal contribution of any particular patent to the retail value.

In 2017, the U.S. Federal Trade Commission [sued](https://www.ftc.gov/news-events/press-releases/2017/01/ftc-charges-qualcomm-monopolizing-key-semiconductor-device-used) Qualcomm for violating both sections of the Sherman Antitrust Act by engaging in a number of anticompetitive SEP licensing practices. In May 2019, the U.S. District Court for the Northern District of California agreed with the FTC, identifying numerous instances of Qualcomm’s unlawful, anticompetitive conduct in a comprehensive [233-page opinion](https://www.eff.org/document/ftc-v-qualcomm-district-court-opinion). We were pleased to see the FTC take action and the district court credit the overwhelming evidence that Qualcomm’s conduct is corrosive to market-based competition and threatens to cement Qualcomm’s dominance for years to come.

But this month, a panel of judges from the Court of Appeals for the Ninth Circuit unanimously [overturned](https://www.eff.org/document/ninth-circuit-opinion-ftc-v-qualcomm) the district court’s decision, reasoning that Qualcomm’s conduct was “hypercompetitive” but not “anticompetitive,” and therefore not a violation of antitrust law. To reach that result, the Ninth Circuit made the patent grant more powerful and antitrust law weaker than ever.

According to the Ninth Circuit, patent owners don’t have a duty to let anyone use what their patent covers, and therefore Qualcomm had no duty to license its SEPs to anyone. But that framing requires ignoring the promises Qualcomm made to license its SEPs on reasonable and non-discriminatory terms—promises that courts in this country and around the world have consistently enforced. It also means ignoring antitrust principles like the essential facilities doctrine, which limits the ability of a monopolist with hold-up power over an essential facility (like a port) to shut out rivals. Instead, the Ninth Circuit held rather simplistically that a duty to deal could arise only if the monopolist had provided access, and then reversed its policy.

But even when Qualcomm restricted its licensing policies in critical ways, the Ninth Circuit found reasons to approve those restrictions. For example, Qualcomm stopped licensing its patents to chip manufacturers and started licensing them only to OEMs. This had a major benefit: it let Qualcomm charge a much higher royalty rate based on the high retail price of the end user devices, like smartphones and tablets, that OEMs make and sell. If Qualcomm had continued to license to chip suppliers, its patents would be “exhausted” once the chips were sold to OEMs, extinguishing Qualcomm’s right to assert its patents and control how the chips were used.

Patent exhaustion is a century-old doctrine that protects the rights of consumers to use things they buy without getting the patent owner’s permission again and again. Patent exhaustion is important because it prevents price-gouging, but also because it protects space for innovation by letting people use things they buy freely, including to build innovations of their own. The doctrine thus helps patent law serve its underlying goal—promoting economic growth and innovation. In other words, the doctrine of exhaustion is baked into the patent grant; it is not optional. Nevertheless, the Ninth Circuit wholeheartedly approved of Qualcomm’s efforts to avoid exhaustion—even when that meant cutting off access to previous licensees (chip-makers) in ways that let Qualcomm charge far more in licensing fees than its SEPs could possibly have contributed to the retail value of the final product.

It makes no sense that Qualcomm could contract around a fundamental principle like patent exhaustion, but at the same time did not assume any antitrust duty to deal under these circumstances. Worse, it’s harmful for the economy, innovation, and consumers. Unfortunately, the kind of harm that antitrust law recognizes is limited to harm affecting “competition” or the “competitive process.” Antitrust law, at least as the Ninth Circuit interprets it, doesn’t do nearly enough to address the harm downstream consumers experience when they pay inflated prices for high-tech devices, and miss out on innovation that might have developed from fair, reasonable, and non-discriminatory licensing practices.

We hope the FTC sticks to its guns and asks the Ninth Circuit to go en banc and reconsider this decision. Otherwise, antitrust law will become an even weaker weapon against innovation-stifling conduct in technology markets.

#### FRAND enforcement is key because of the massive exclusionary power conferred upon SEP holders.

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I. Standard Setting and the Competitive Process

The fundamental economics in the information technology sector, driven by network effects, implies that there is enormous value associated with establishing compatibility standards. Popular standards include the mobile broadband standards used in cell phones, which are established by the 3rd Generation Partnership Project (3GPP), and the Wi-Fi technology for wireless local area networks, which is enabled by the 802.11 standard established by the Institute of Electrical and Electronics Engineers (IEEE).4

There are many SSOs, and their rules and procedures differ considerably. In addition to IEEE, leading SSOs include the International Organization for Standardization (ISO), the International Telecommunication Union (ITU), the European Telecommunications Standards Institute (ETSI), the Internet Engineering Task Force (IETF), and the World Wide Web Consortium (W3C).5 SSOs generally establish standards by holding a series of committee meetings among industry participants. These meetings culminate in a vote on a technical specification that describes what features or attributes a product must have in order to comply with the standard. Most SSOs are open to all industry participants and seek to operate on a consensus basis, applying certain voting rules. SSOs do not normally engage in patent licensing, nor do they specify how patent royalties will be divided up among patent holders. They leave that to their members, which in some cases form patent pools to address these issues.6

SSOs adopt specific policies relating to intellectual property rights (IPRs).7 These IPR policies are generally intended to enable the SEP holders to obtain reasonable royalties for licensing their patents, while prohibiting them from charging excessive royalties after other industry participants have committed to the standard. At that point, firms committed to implementing the standard— which we call “implementers”—would find it very costly to avoid using the patented technology. For this purpose, most SSOs require SEP owners to license their SEPs on FRAND terms.8

FRAND policies are especially necessary because negotiations between SEP holders and implementers generally take place only after the implementers have used and infringed the technologies claimed by the SEPs. Standards involving information and communications technology can involve hundreds or even thousands of SEPs, many with uncertain boundaries for infringement. In addition, a time lag exists between patent application and patent issuance. For these and other reasons, it is impractical for implementers to enter into negotiations for patent licenses with all SEP owners prior to the establishment of a standard and to their implementation of it.9

The fact that patent negotiations generally do not take place until after implementers have used and infringed the technologies has several critical implications. First, at the time of negotiation, implementers are locked into the standard and the technologies claimed by the SEPs—that is, the cost to switch to an alternative technology or standard at that point—ex post—is much greater than it was ex ante, before the patented technology was first included in the standard. Ex post, the patent holder is no longer competing to have its technology included in the standard, nor is it competing to have implementers of the standard use its technology. Instead, because the patent holder owns an asset that is essential to the standard, implementers have no choice but to use the patented technology.

If the standard is commercially successful, implementers are willing to pay a much larger royalty for use of the patented technology than they would have paid ex ante, when the SEP holder faced competition from other technologies. In these circumstances, the SEP holder can be said to have obtained monopoly power in the market in which the patented technology is licensed for use in implementing the standard.10

Second, because of lock-in and the implementer’s ongoing infringement, the potential for litigation looms large in licensing negotiations. In effect, the parties are negotiating about how to settle an infringement suit, and that negotiation is heavily influenced by their predictions as to what the court will do if they cannot agree. This situation is not unique to SEPs; it arises frequently when firms are faced with patent infringement claims for products they have independently developed or technologies they have inadvertently infringed. Patent law addresses such instances by specifying that patent holders are entitled to “reasonable royalties,” defined as the royalties that the parties would have negotiated prior to the infringement and thus prior to lock-in.11 Those hypothetical ex ante royalties reflect the market value of the patent license. Notwithstanding the law’s embrace of this principle, however, as a practical matter, patent holders are generally able to recover more than the ex ante value of the patent when litigation occurs after the implementers are locked in. Further, negotiations in the shadow of litigation after lock-in tend to result in royalties in excess of the ex ante or market value of the patented technology.12

Third, the shadow of litigation is particularly problematic in the communications and technology sector, in which products typically include hundreds or thousands of patented technologies. A court-ordered injunction involving such products would deprive the implementer of not only the value of the technology covered by the patent-in-suit, but also the value of the entire product.13 Implementers that are forced to bear the risk of an injunction are thus induced to agree to royalties greater than those that would be appropriate if only the value of the patented technology were at stake. Those royalties systematically provide SEP holders with excessive compensation in comparison with the benchmark of ex ante royalties.

These implications of lock-in and ex post dealings are well-understood: they represent an example of the general concept of lock-in and opportunism developed by Oliver Williamson.14 The Federal Circuit has also recognized the market distortions caused by the inclusion of patented technologies in public standards and the resulting danger of patent holdup involving SEPs.15

For these and other reasons, the SEP holder has ex post monopoly power that, if left unchecked, would enable it to obtain royalties far in excess of the royalties that it could earn in a competitive market.16 To address this common problem and limit ex post opportunism by SEP holders, SSOs typically require participants that own SEPs to make certain FRAND commitments. In particular, by requiring a commitment to license on “fair and reasonable” terms, the FRAND requirement aims to prevent, or at least reduce, the extent of monopoly pricing by SEP holders. And by requiring a commitment to license on “nondiscriminatory” terms, the FRAND requirement can prevent SEP holders from extracting monopoly premiums by selective licensing or, more important, migrating their monopoly power from the FRAND-regulated market to unregulated standard-implementing product markets by licensing to only one or a few implementers or licensing to selected implementers on discriminatorily favorable terms.

#### Weakened antitrust enforcement emboldens firms to follow Qualcomm’s lead, which collapses FRAND integrity.

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While the FRAND process has been highly productive, it is also fragile. Firms are tempted to make commitments at the beginning when the incentive to join is large, but renege on them later when they can profit by doing so. At least in this particular case, private FRAND enforcement had not worked very well. Qualcomm had been able to violate FRAND commitments in order to exclude rivals and obtain higher royalties than FRAND would permit, largely with impunity. Other firms will very likely follow Qualcomm’s lead. If that happens the FRAND system will fall apart, doing irreparable injury to the modern wireless telecommunications network or, at the very least, diminishing the leadership role of the United States in preserving effective network competition.

While governments can be heavily involved in standard set-ting,9 the implementation of technical standards in information technologies is largely the work of private actors. Government involvement is limited mainly to enforcement of contract, intellectual property, or antitrust law. As private actors, those involved in standard setting or compliance are fully subject to the federal antitrust laws.

This Article addresses one question: when is an SSO participant’s violation of a FRAND commitment an antitrust violation, and if it is, of what kind and what are the implications for remedies? It warns against two extremes. One is thinking that any violation of a FRAND commitment is an antitrust violation as well. In the first instance FRAND obligations are contractual, and most breaches of contract do not violate any antitrust law. The other extreme is thinking that, because a FRAND violation is a breach of contract, it cannot also be an antitrust violation. The question of an antitrust violation does not de-pend on whether the conduct breached a particular agreement but rather on whether it caused competitive harm. This can happen because the conduct restrained trade under section 1 of the Sherman Act, was unreasonably exclusionary under section 2 of the Sherman Act, or amounted to an anticompetitive condition or understanding as defined by section 3 of the Clay-ton Act.10 The end goal is to identify practices that harm com-petition, thereby injuring consumers.

The Ninth Circuit’s Qualcomm decision will make antitrust violations in the context of FRAND licensing much more difficult to prove, even in cases where anticompetitive behavior and consumer harm seem clear.11 Indeed, in this case the court itself acknowledged the harm to consumers but appeared to think that they were not entitled to protection.12 If this decision stands, FRAND obligations will to a larger extent have to be settled through private litigation and the federal antitrust enforcement agencies will have a diminished role. Anticompetitive behavior by one firm that is not effectively disciplined will lead others to do the same thing.

#### A trusted, credible system for ICT innovation is critical to rapid tech diffusion and growth---absent FRAND, the system will collapse.

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It is easy to take a pessimistic view about whether the system will break. If the current trend continues, the system is likely to break at some point for the simple reason that companies will not trust it anymore. The series of legal disputes witnessed over the past years – sometimes referred to as the “smartphone patent wars” – has been fodder for a pessimistic reading of “the two tales of SEPs”. While it is common in the business world that disputes over patents and licenses are settled in courts, various SEP disputes have revealed problematic aspects of the SEP market that are different from those disputes that follow the normal stream of business and contracts. Often, the SEP disputes are less concerned about the rights and boundaries of patents, and more about antitrust limits to market behavior: they concern market abusive practices and restrictions to competition as much as they are about intellectual property.

If the SEP system actually does break at some point, the consequences would be felt throughout the economy. SEPs have been a critical part of the ICT revolution. SEPs have allowed for the fast rates of innovation diffusion that the world has witnessed over the past quarter of a century. All the computer and Internet related products and services that people are now dependent upon for their private and professional lives are intricate webs of intellectual property. As many as 250,000 patents can be used to claim ownership of some technical specification or design element in a single smartphone (NYT 2012). A laptop, suggests one calculation, implements more than 250 interoperability standards (Biddle et al. 2010), and the number of SEP holders for 3G and 4G standards grew from 2 in 1994 to 130 in 2013 while the number of SEPs rose from fewer than 150 in 1994 to more than 150,000 in 2013 (Galetovic and Gupta 2016). The standardization-body ETSI has registered more than 150,000 declarations of SEPs from companies, and ETSI is just one of many bodies in the world of ICT standardization. For the 3G standard, the same body has about 24,000 patents that have been declared essential. Now, with the economy yet again on the threshold of big technological change, a trusted and credible system for creators and users of technology to standardize proprietary technology would be a boon for innovation, interoperability and – ultimately – the consumers.

And there are reasons for optimism. Although many of the problems in the SEP regimes need to be addressed, the numbers above indicate that the SEP system is in fact attractive to patent holders and SEP implementers. It is easy to see why: neither holders nor implementers are presented with alternative options that on the face of it would be far more profitable for them. In other words, there simply would not be as many patents declared as essential if both creators and users of technology believed the SEP system worked to their disadvantage or was grossly unfair. While the reality for some companies may be that legal disputes and unpredictability prompt them to find other ways than SEPs to get access to key technologies for their products, it remains the case that most stakeholders have strong economic incentives to maintain a balanced SEP system that is trusted.

First, standard essential patents are an asset for creators of technology because, by becoming essential to a standard, their volumes of sales for technologies that users value rise significantly. As many holders want to raise more revenues for their SEPs and – ideally – have the freedom to contract with buyers on their terms, they can expand their customer base when they agree to sell patented technology in accordance with a set of rules that are designed to prevent SEP holders exploiting the weakness of a customer that has grown dependent on having access to their technology.

Second, SEPs are hugely beneficial also to those that buy the licenses – the implementers or users. Through the SEP system, they can access technologies that are interoperable and work with different products and functionalities – and they can do it under conditions that, if history is a guide, in most cases give them stable and predictable terms of contract. As a consequence, both creators and users can focus on their competitive advantages and profit on the economies of scale and specialization. Downstream firms do not need to develop their own upstream technology and upstream firms do not need to package their technologies in end-customer products in order to make their products valuable.

Third, standard-setting organisations (SSOs) also have a big stake in an SEP system that works well – and, like creators and users of technology, they would stand to lose significantly if the SEP system were to collapse.

Lastly, the biggest beneficiaries are individual consumers – those who buy the end products using FRAND-conditioned SEPs. The advent of SEPs and the rules represented by FRAND have enabled a development of fast technology creation and contributed to the rapid diffusion in ICT goods and ICT-based services. The SEP system has also allowed for new competition, both between existing technologies and brands, and from new ones that have stepped into the market with the ambition to disrupt it, again to the benefit of the consumer. It is difficult to imagine that the ICT and digital development would have been as fast as it has been if SEPs had not been a central feature of the market.

The changing fortunes of companies operating in the cellular and smartphone market would not have been possible if there had not been an SEP system that supported competition. Now that the world economy is on the doorstep of new innovations that are dependent on a great number of input technologies – e.g. the Internet-of-Things, transport connectivity and intelligent vehicles – it is crucially important for the consumer that a balanced and functioning SEP system is maintained and that actors in the system converge towards it – which would ultimately meet their economic interests.

#### ICT innovation unlocks productivity feedbacks that are crucial to post-COVID economic recovery and long-term growth.

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Introduction

As the global economy has entered recession in 2020, triggered by the COVID-19 pandemic, the human casualties, and economic damage are perceived to be very large. Even as the health crisis will gradually become manageable, the impact on economic growth can be long-lasting and the recovery path can take several years. In particular, growth drivers such as the pace of job creation, income generation and investment may take several years to get back to pre-crisis trends. Initially the productivity of those growth drivers may be of less concern as the mantra of ‘we’ll do what it takes to avoid worse’ is predominant in this phase of the crisis.

However, once the recovery gets underway the productive use of resources is key to sustained growth. While we do not ignore the short-term challenges of the economic recovery, our primary focus in this paper is on the productivity puzzle from a long-term perspective. Productivity is driven by technological change and innovation which, in turn, depends on investment in human and physical capital as well as in other ‘missing capitals’ often referred to as intangible assets. Indeed, those investments create a positive feedback effect, as the productivity it generates also helps to make more efficient usage of scarce resources in the future. When properly measured and valued, productivity also provides a critical yardstick to realise a fairer distribution of the gains from economic growth to those who bring the resources to bear. It thereby creates the incentives for people to produce and business to invest helping to drive economic growth and raise living standards.

Unfortunately, in the aftermath of the global financial crisis of 2008/2009, many economies around the world, especially advanced economies, have failed to recharge the economy by powering productivity as the key source of growth in the long term. Indeed the latest update of The Conference Board Total Economy Database (July 2020) points at significant weakening in labor productivity growth in Europe up to 2019 (figure 1a–c). While the United States experienced somewhat faster productivity growth from 2017 to 2019 than the Euro Area and the United Kingdom, it still has not recovered to the rates of productivity growth from before the global financial crisis either.

The slowdown in productivity growth over the past 15 years has been well documented. There are multiple causes including an exhaustion of catch-up potential in emerging markets impacting economies along entire global value chains, and the drag from the global financial crisis because of low demand and weak investment, too low interest rates causing misallocations an overreliance on cheap labor, and failing fiscal policies (Bauer et al., 2020; Cette et al., 2016; Crafts, 2018; Dieppe, 2020; Fernald et al., 2017; Syverson, 2016).1 Technical measurement issues regarding inputs and outputs may have played a role as well.

In our earlier work we have stressed the importance of time lags in the adoption of new technologies, and in particular the complexity in generating productivity growth from the latest round of new digital technologies since the early 2010s, including the move toward mobile, ubiquitous access to broadband, the rise of cloud storage and advances in artificial intelligence (AI) and robotics (van Ark, 2016a, 2016b; van Ark and O’Mahony, 2016; van Ark et al., 2016).

While the first priority for economic recovery from the COVID-19 crisis is to restore jobs, it is important that any employment-intensive growth path does go together with a productivity revival. In this paper, we argue that it is possible to avoid another productivity slowdown. Underneath the aggregate figures, there is evidence pointing toward a possible tipping point at which many advanced economies may expect to see more widespread impacts from the adoption and absorption of digital technology on productivity and GDP growth.

In Section 2 we review the latest literature on the productivity impacts of general purpose technologies (GPTs), including the notion of time lapses through which digital technologies result in faster productivity growth. We also look at patterns by which innovation and productivity effects GPTs emerge across industries and disperse across the economy. We explain why the New Digital Economy (NDE) is especially characterised by long lag effects.

In Section 3 we provide an empirical analysis of productivity growth by industry data to observe whether we can detect a distinct pattern across groups of industries pointing to a structural improvement in recent years. We use a taxonomy on digital intensity by industry which was recently developed by the Organisation for Economic Co-operation and Development (OECD) (Calvino et al., 2018), showing that the most digital-intensive industries have experienced a relatively strong performance in terms of labor productivity growth since 2007 and especially since 2013.

In Section 4 of the paper, we discuss the connection between labor and skills in the digital economy, which we believe provides the key to a productivity revival. We developed a new metric on innovation competencies by occupation on the basis of data from the O\*Net database on occupation-specific descriptors in the United States (Hao et al., 2018). When applied to the United Kingdom, we find that innovation competencies point at stronger productivity effects by industry.

In Section 5 we focus on how productivity has been behaving in the short-term during the COVID-19 recession. In particular, we address the potential trade-offs between traditional pro-cyclical recovery effects and scarring effects the recession leaves, especially on the labor market. We argue that increased adoption and usage of digital technologies during the COVID-19 crisis may create a positive productivity effect. In the final section, Section 6, we will review our hypothesis that a productivity revival could be imminent in the light of the recovery from the COVID-19 crisis. In order not to miss this opportunity again, as happened a decade ago, we argue that a coordinated effort from business and policy is needed, and has to be delivered in such a way that the gains from productivity will be more widespread and such that those who provide the resources for growth are incentivised to deliver them in an efficient way.

2. The productivity paradox of the New Digital Economy

It is well known that General Purpose Technologies (GPTs), defined as new methods of producing and inventing new goods and services which are important enough to have a long-term aggregate impact on the economy, can take a significant amount of time to translate to faster productivity growth at the aggregate level of the economy. This is inherent to the three critical characteristics of a GPT as identified by Bresnahan and Trajtenberg (1995).2

1. Pervasiveness –The GPT should spread to most sectors.

2. Improvement –The GPT should get better over time and, hence, should keep lowering the costs of its users.

3. Innovation spawning –The GPT should make it easier to invent and produce new products or processes.

Historical analysis has focussed on productivity trends in previous technology phases (Bakker et al., 2019; Crafts, 2004). Recent literature has shown that the information and communication technology (ICT) revolution of the past 50 years can be characterised as a GPT and doesn’t pale with previous GPTs such as steam technology, electricity and the combustion engine. For example, Hempell (2005) concludes that ‘investment in information and communication technologies (ICT) are closely linked to complementary innovations and are most productive in firms with experience from earlier innovations’. In a more recent analysis of the evolution of the Internet, Simcoe (2015) argues that the modularity of the internet has prevented a fall in return to investments in innovation by ‘facilitating low-cost adaptation of a shared general-purpose technology to the demands of heterogeneous applications’. In a review of the data, Liao et al. (2016) conclude that:

‘...ICT investment does contribute to productivity but not in the usual manner –we find a positive (but lagged) ICT effect on technological progress. We argue that for a positive ICT role on growth to actually take place, a period of negative relationship between productivity and ICT investment together with ICT-using sectors’ capacity to learn from the embodied new technology was crucial. In addition, it took a learning period with appropriate complementary co-inventions for the new ICT-capital to become effective and its gains to be realised. Our findings provide solid, further empirical evidence to support ICT as a general purpose technology’.

#### Growth solves nuclear war.

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What Is To Be Done?

The first marching order is to dodge any kind of perpetual war of the sort that George Orwell outlined in  “1984,” which engulfed the three super states of Eastasia, Eurasia, and Oceania, and made possible the totalitarian Big Brother regime. A long-running Cold War-type confrontation would almost certainly take another form than the one that ran from 1945 until the downfall of the Soviet Union.

What prescriptions can be offered in the face of the escalating competition among the three global powers? First, by staying militarily and economically strong, the United States will have the resources to deter its peers’ hawkish behavior that might otherwise trigger a major conflict. Judging by the history of the Cold War, the coming strategic chess match with Russia and China will prove tense and demanding—since all the countries boast nuclear arms and long-range ballistic missiles. Next, the United States should widen and sustain willing coalitions of partners, something at which America excels, and at which China and Russia fail conspicuously.

There can be little room for error in fraught crises among nuclear-weaponized and hostile powers. Short- and long-term standoffs are likely, as they were during the Cold War. Thus, the playbook, in part, involves a waiting game in which each power looks to its rivals to suffer grievous internal problems which could entail a collapse, as happened to the Soviet Union.

Some Chinese and Russian experts predict grave domestic problems for each other. They also entertain similar thoughts about the United States, which they view as terminally decadent and catastrophically polarized over politics, ethnicity, and the future direction of the country. So, the brewing three-way struggle also involves a systemic contest, which will test the competitors’ economic and political institutions.

At this juncture, the world is entering a standoff among the three great and several not-so-great powers. Averting war, while defending our interests, will prove a challenge, calling for deft policy, political endurance, and economic growth, as well as sufficient military force to keep at bay aggressive states or prevail over them if ever a war breaks out.

#### Absence of domestic 5G competition cedes leadership in technical standards to China.

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There is little doubt today that American superiority in the next generation of mobile communications, commonly called 5G, is a matter of extraordinary national concern. There is also little doubt that China is a strong competitor, already having outspent the United States by [$24 billion](https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/us-tmt-5g-deployment-imperative.pdf#page=3) and planning [$411 billion](https://www.scmp.com/tech/china-tech/article/2098948/china-plans-28-trillion-yuan-capital-expenditure-create-worlds) in 5G investment over the next decade. The Chinese government has also laid out multiple national plans for establishing the country as a leader in mobile technology, and the Chinese firm Huawei is poised to be the [top smartphone manufacturer](https://www.cnbc.com/2018/11/16/huawei-aims-to-overtake-samsung-as-no-1-smartphone-player-by-2020.html) by 2020.

And what are United States companies doing about this? Bickering over patents.

For years, the leading American supplier of advanced mobile communications chips has been the San Diego-based Qualcomm. The company has been an innovator of mobile technology, but it has also been a remarkable innovator of convoluted legal strategies. As an ongoing Federal Trade Commission [lawsuit alleges](https://www.ftc.gov/news-events/press-releases/2017/01/ftc-charges-qualcomm-monopolizing-key-semiconductor-device-used), Qualcomm has used its dominant position as a chip supplier and its extensive patent holdings to weave an intricate web of patent licensing across the mobile industry. The effect of that complex licensing scheme, the FTC claims, has been to force competitor chipmakers out of the market and to extract concessions and high patent royalties from smartphone and mobile-device makers.

Qualcomm today faces only one major U.S. competitor—Intel, whose chips Apple recently [started using](https://www.cultofmac.com/484250/intel-reaping-rewards-apples-scrap-qualcomm/) instead of Qualcomm’s. Not surprisingly, Qualcomm has leveraged its patents to force a retaliatory investigation against Apple, the effect of which could be, as an administrative judge [recently determined](http://www.fosspatents.com/2018/10/itc-judge-didnt-buy-testimony-for-which.html), to boot Intel out of the mobile-chip market and leave Qualcomm as a monopoly.

It is hard to imagine that this infighting among Apple, Intel and Qualcomm is getting the United States very far in 5G, and it is harder to imagine that Qualcomm’s desired outcome would do so, either. The best path, instead, is the obvious one: allowing competition and expanding the number of firms working on 5G.

Competition encourages companies to out-innovate each other in order to grab market share. Of particular importance to 5G, competition leads to [better cybersecurity](https://morningconsult.com/opinions/in-the-race-to-5g-monopoly-considered-harmful/) in products, making them less vulnerable to hacking or misuse.

Competition is especially crucial when it comes to the technical standards that define how 5G works. These standards are the work of 3GPP, an international consortium of technology companies in the field. Chinese players such as Huawei and ZTE are major participants in 3GPP. Ensuring that 3GPP’s standards reflect American values requires having as many American companies at the negotiating table as possible—which is harder to achieve when those companies are trying to sue each other out of business.

Certainly patents themselves, as rewards for new inventions, are a driver of innovation in areas such as 5G. The problem, though, is not the existence of a patent system but the ever-expanding power of the patent laws, which encourage companies to pour dollars into complex patent licensing and assertion schemes—as companies like Qualcomm have done—rather than to perform the hard work of building new technologies. When innovation in patent strategy is more profitable than actual innovation, we lose the race to 5G and other technologies.

But don’t take my word for it. [Multiple members of Congress](https://www.patentprogress.org/2019/01/11/congress-weighs-in-on-qualcomm-and-apple-at-the-itc/), from both sides of the aisle, have denounced the use of patents to kick companies like Intel out of 5G development, predicting that such actions would “dampen the quality, innovation, competitive pricing, and in this case the preservation of a strong U.S. presence in the development of 5G and thus the national security of the United States.”

Or look to what China itself is doing. The Chinese government is handing out rewards left and right to encourage technology research and development. Indeed, it grants subsidies and financial benefits (ranging from the [ordinary](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2818503) to the [imperfect](https://funginstitute.berkeley.edu/wp-content/uploads/2013/12/patent_subsidy_Zhen.pdf) to the [bizarre](https://www.scmp.com/news/china/article/1681850/how-get-out-jail-early-china-buy-inventors-idea-and-patent-it)) to encourage its citizens to file for patents. But while China specifically encourages filing for patents, it does little to encourage using them: Patent infringement awards in court are peanuts—often only [five figures](https://scholarship.law.berkeley.edu/btlj/vol33/iss2/2/)—and most Chinese patent owners drop their patents [within five years](https://www.bloomberg.com/news/articles/2018-09-26/china-claims-more-patents-than-any-country-most-are-worthless) of getting them. The message in China is clear: You will be rewarded for innovating, but not for quibbling over patents.

The United States should take the same tack if it wants to match China in 5G. Ever-stronger patent rights encourage counterproductive disputes that are a drag on industry, a drag on research and development, and ultimately a drag on domestic competitiveness on the global stage. If America wants to lead in 5G, then it must clear the path for strong competition among leading American technology companies.

#### Standards leadership allows China to export digital authoritarianism.

Drew et al. 21, \*Dr Alexi Drew, Research Associate, The Policy Institute, King’s College London; (May 7th, 2021, “The Critical Geopolitics of Standards Setting”, https://www.transatlantic-dialogue-on-china.rusi.org/article/the-critical-geopolitics-of-standards-setting)

However, this previously ‘western’ domain is challenged by a Chinese bloc of private industry actors with centrally directed, strategic motivations for their efforts who have managed to leverage the flaws of this system for political and economic advantage.  The market-driven self-regulation model of technical standards has proven itself unsustainable given the geopolitical power achievable through the control of these standards. The marketised approach is easily abusable by a technologically developed nation-state with geopolitical intentions firmly in mind.

Obscurity Through Complexity

Technical standards have the immediate appearance of being both apolitical and ethically neutral. This seems to set them apart from the debate over standards of state behaviour in [cyber space concerning espionage and actions below the threshold of armed conflict](https://www.cfr.org/blog/unexpectedly-all-un-countries-agreed-cybersecurity-report-so-what). Yet, technological standards are unequivocally connected to normative practices of international behaviour and ethics. The extremely complex nature of the standards under consideration in bodies such as the International Organization for Standardization, the International Electrotechnical Commission (IEC), the International Telecommunications Union (ITU), and the Third Generation Partnership Project (3GPP) obscures the very tangible real-world impact that the standards they set have. The 3GPP is responsible for standards setting for mobile telecommunications. It covers everything from 5G through to autonomous vehicles and the Internet of Things. These are the bodies defining how the modern world is constructed.

On the one hand they appear quite benign, responsible for such banalities as the use of Universal Serial Bus (USB) connectors versus proprietary standards. This hardly seems a matter of national security importance. But the same process is responsible for what ultimately shape the basic operating parameters of facial recognition technology in closed circuit television systems, the level of centralised state control at the technical foundations of the internet, and the protections of personally identifiable data. These generate profound implications for international policy and ethics.

Internal Competition vs Strategic Direction

Technical standards setting processes have, historically, been dominated by private sector actors who have had both the capacity to develop a particular technology to the point of holding a significant market share, and the ability to use that market share to advocate for the standardisation of the technology in line with their own production. The market led approach has continued to be the prevailing model by which American companies have globalised the technical standards behind US dominated technological innovation. This privatised form of self-regulation for technology companies is only partially influenced by the approach taken within the EU where [some licensing of standards are controlled by state or EU led institutions.](https://www.ui.se/globalassets/ui.se-eng/publications/ui-publications/2019/ui-brief-no.-2-2019.pdf)

In contrast to this approach the Chinese model has involved a high level of state-oriented direction, oversight, and direct engagement on the creation and signing off technical standards. Efforts to harmonise and centralise technical standards domestically have become increasingly internationalised as the CCP takes this centralised, strategic approach to technical standards setting bodies such as the ITU, 3GPP, and IEC. Technical standards have also become an increasingly central component of the Digital Silk Road with the openly expressed goal of increasing uptake of Chinese technical standards in partner countries.

The implications of this clash between a system of technical standardisation that is driven by the market versus one driven by an authoritarian government subsidised model are a direct challenge to the development of free, open, and ethical technology. Standardisation mechanisms have become political, or rather there has been a gradual realisation of the political power to be gained from the control of technical standards. While the PRC might have come to this awareness first, the US and Europe have since had a rude awakening about the missed opportunity. The privatised model of technical standards setting favoured by European and US markets relies upon the dynamics of financial competition to regulate behaviour. This is in stark contrast to the statist Chinese model.

#### Causes global backsliding.

Kendall-Taylor et. al 20 \*Andrea Kendall-Taylor, senior fellow and director of the Transatlantic Security Program at the Center for a New American Security, co-author of Democracies and Authoritarian Regimes; Erica Frantz is Assistant Professor of Political Science at Michigan State University; Joseph Wright is Professor of Political Science at Pennsylvania State University; (March/April 2020, “The Digital Dictators,” Foreign Affairs, <https://www.foreignaffairs.com/articles/china/2020-02-06/digital-dictators>)

The risk that technology will usher in a wave of authoritarianism is all the more concerning because our own empirical research has indicated that beyond buttressing autocracies, digital tools are associated with an increased risk of democratic backsliding in fragile democracies. New technologies are particularly dangerous for weak democracies because many of these digital tools are dual use: technology can enhance government efficiency and provide the capacity to address challenges such as crime and terrorism, but no matter the intentions with which governments initially acquire such technology, they can also use these tools to muzzle and restrict the activities of their opponents.

#### Democracy caps a litany of converging existential threats.

Diamond 19, Professor of Political Science and Sociology at Stanford University, Senior Fellow at the Hoover Institution, Senior Fellow at the Freeman Spogli Institute for International Studies, PhD in Sociology from Stanford University, (Dr. Larry, Ill Winds: Saving Democracy from Russian Rage, Chinese Ambition, and American Complacency, p. 199-202)

The most obvious response to the ill winds blowing from the world’s autocracies is to help the winds of freedom blowing in the other direction. The democracies of the West cannot save themselves if they do not stand with democrats around the world. This is truer now than ever, for several reasons. We live in a globalized world, one in which models, trends, and ideas cascade across borders. Any wind of change may gather quickly and blow with gale force. People everywhere form ideas about how to govern—or simply about which forms of government and sources of power may be irresistible—based on what they see happening elsewhere. We are now immersed in a fierce global contest of ideas, information, and norms. In the digital age, that contest is moving at lightning speed, shaping how people think about their political systems and the way the world runs. As doubts about and threats to democracy are mounting in the West, this is not a contest that the democracies can afford to lose. Globalization, with its flows of trade and information, raises the stakes for us in another way. Authoritarian and badly governed regimes increasingly pose a direct threat to popular sovereignty and the rule of law in our own democracies. Covert flows of money and influence are subverting and corrupting our democratic processes and institutions. They will not stop just because Americans and others pretend that we have no stake in the future of freedom in the world. If we want to defend the core principles of self-government, transparency, and accountability in our own democracies, we have no choice but to promote them globally. It is not enough to say that dictatorship is bad and that democracy, however flawed, is still better. Popular enthusiasm for a lesser evil cannot be sustained indefinitely. People need the inspiration of a positive vision. Democracy must demonstrate that it is a just and fair political system that advances humane values and the common good. To make our republics more perfect, established democracies must not only adopt reforms to more fully include and empower their own citizens. They must also support people, groups, and institutions struggling to achieve democratic values elsewhere. The best way to counter Russian rage and Chinese ambition is to show that Moscow and Beijing are on the wrong side of history; that people everywhere yearn to be free; and that they can make freedom work to achieve a more just, sustainable, and prosperous society. In our networked age, both idealism and the harder imperatives of global power and security argue for more democracy, not less. For one thing, if we do not worry about the quality of governance in lower-income countries, we will face more and more troubled and failing states. Famine and genocide are the curse of authoritarian states, not democratic ones. Outright state collapse is the ultimate, bitter fruit of tyranny. When countries like Syria, Libya, and Afghanistan descend into civil war; when poor states in Africa cannot generate jobs and improve their citizens’ lives due to rule by corrupt and callous strongmen; when Central American societies are held hostage by brutal gangs and kleptocratic rulers, people flee—and wash up on the shores of the democracies. Europe and the United States cannot withstand the rising pressures of immigration unless they work to support better, more stable and accountable government in troubled countries. The world has simply grown too small, too flat, and too fast to wall off rotten states and pretend they are on some other planet. Hard security interests are at stake. As even the Trump administration’s 2017 National Security Strategy makes clear, the main threats to U.S. national security all stem from authoritarianism, whether in the form of tyrannies from Russia and China to Iran and North Korea or in the guise of antidemocratic terrorist movements such as ISIS.1 By supporting the development of democracy around the world, we can deny these authoritarian adversaries the geopolitical running room they seek. Just as Russia, China, and Iran are trying to undermine democracies to bend other countries to their will, so too can we contain these autocrats’ ambitions by helping other countries build effective, resilient democracies that can withstand the dictators’ malevolence. Of course, democratically elected governments with open societies will not support the American line on every issue. But no free society wants to mortgage its future to another country. The American national interest would best be secured by a pluralistic world of free countries—one in which autocrats can no longer use corruption and coercion to gobble up resources, alliances, and territory. If you look back over our history to see who has posed a threat to the United States and our allies, it has always been authoritarian regimes and empires. As political scientists have long noted, no two democracies have ever gone to war with each other—ever. It is not the democracies of the world that are supporting international terrorism, proliferating weapons of mass destruction, or threatening the territory of their neighbors.

#### Emergence of smart cities depends on IoT applications of 5G interoperability standards---absent FRAND, excessive royalties will undermine sustainable development.

Schwartz 18, \*Matt Schwartz, Privacy Fellowship Coordinator at ACT, App Association; (March 2nd, 2018, “It’s Smart to be FRANDly: How the FRAND Commitment Will Determine the Future of Smart Cities”, https://actonline.org/2018/03/02/its-smart-to-be-frandly-how-the-frand-commitment-will-determine-the-future-of-smart-cities/)

In December, we [outlined](https://actonline.org/2017/12/18/smart-cities-connecting-your-community-through-technology/%5d) the emergence of Smart Cities – cities that harness technological innovations like internet of things (IoT) devices and data analytics to improve essential infrastructure in growing urban centers. The technological foundation of Smart Cities aims to improve public safety, better allocate resources, and meet the needs of citizens more quickly.

A central element to Smart Cities is the comprehensive network of sensors and devices implemented within buildings, roads, traffic signs, and parking meters that allows them to interact with public, and potentially private-owned, infrastructure. These sensors will “speak” to one another, communicating information about energy usage, traffic density, or other elements of city management that have traditionally either been analyzed separately or not tracked at all. The potential of Smart Cities allows data to flow from previously disconnected branches of the city and be processed in real-time, unlocking previously unknown insights.

The powerful interoperability of Smart Cities will rely heavily on standardized technologies developed in organizations like the IEEE, which is responsible for standardizing the wi-fi technology we use every day. Standardized technologies often include standard-essential patents (SEPs), which, like their name suggests, are patents declared essential to an industry standard by a standards-setting organization. In simple terms, one cannot implement the standardized technology without using the patent.

Like regular patents, the users of SEPs must pay royalties or licensing fees to the patent owner before they may use it. For example, if a manufacturing company wants to make an IoT device interoperable with a 5G network, the manufacturer must pay a licensing fee to the owner of the SEP that is essential to the 5G standard. SEPs play a vital role in the new innovations we enjoy and have come to expect, and because of the value of these patents, SEP holders have the ability to demand high license fees from those who wish to implement the standard. To offset this competition issue, many SEP holders voluntarily agree to license their SEPs to any willing licensee under fair, reasonable, and non-discriminatory (FRAND) terms.

While wi-fi and LTE are standards that will be vital to Smart City deployment, countless new standardized technologies are being developed that will be integral to any fully-operational Smart City. With reasonable access to SEPs, assured by the FRAND commitment, innovators can enjoy the legal and business certainty they need to compete. While the meaning of the FRAND commitment continues to be refined – as evidenced by the development of SEP best practices recently launched by the App Association in Europe – its foundations are well-established.

But what happens when SEP holders do not abide by the FRAND licensing commitment, or simply refuse to license at all? Sadly, small and medium-sized companies would be forced to accept untenable licensing terms, but more realistically, they would be priced out of using the standard altogether. As a result, it would impose a barrier to innovation that would result in fewer products offered to consumers or cities eager to implement IoT technologies. For example, many hope the rise of autonomous vehicles will be seamlessly integrated into the Smart City network. But how beneficial would it be if only some autonomous vehicle brands are able to license the technology needed to communicate with traffic lights, simply because of the market power of a chipmaker? The FRAND commitment is an important backstop to that unfortunate possibility.

It is vital for SEP holders to honor FRAND licensing terms, if not for small and medium-sized innovators, then for the sustainability of future Smart Cities. FRAND creates a platform for innovation, providing a floor on which companies can stand, innovate, and compete. If the foundation of the FRAND commitment is reneged, American innovators pay a steep price – not only do they lose a key component of product development and market entry, but they are also left with years of expensive negotiations and litigation if they choose to challenge the licensing practice. What’s more, the confidence developed in the open standards development system is shaken, and Smart Cities have fewer choices in IoT solutions for their future.

To achieve the promise of Smart Cities, a balanced standards ecosystem is essential. We must allow small and medium-sized developers to leverage industry standards for innovation and prevent cost-prohibitive royalty structures and negotiating practices that are detrimental to competition, while also ensuring that SEP owners can protect their intellectual property and be fairly compensated for its use. The FRAND commitment continues to be the best framework to achieve this balance, and adherence to its principles will determine the future and success of Smart Cities.

#### Climate change is anthropogenic and existential---5G-enabled smart cities are critical for mitigation and adaptation.

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Currently, the entire planet is at risk due to continual climate change [1–3]. The recorded increase in average temperature across the world in the past hundred years, and the associated changes attributed to this, are known as global warming. Many scientists are convinced by the published evidence that this change is anthropogenic and resulted from the elevated emission levels of global greenhouse gases (GHGs) [4,5]. Gases such as water vapor, carbon dioxide, methane, nitrous oxide, and ozone are responsible for the absorption and emission of thermal radiation. These changes in the relative quantities of the GHGs induce a proportional change in the amount of preserved solar energy. Presently, the accepted indicator for global warming is the sustained rise in the mean temperature worldwide. This definition is designed to account for the fact that there may be some localized exceptions to this rise. For example, there may be cooling experienced in a region while the global temperature may increase altogether, hence the need for average temperature. A key concern with the GHGs trapping of more heat in the atmosphere is that it affects both climate and short scale weather patterns. Consequently, it results in greater numbers of adverse weather events such as storms, heat waves, cold snaps, droughts, and fires [6]. Climate-related risks to health, livelihoods, food security, water supply, human safety, and economic growth are projected to increase with global warming of 1.5 ◦C [7] and further increase further at 2 ◦C, as shown in Figure 1. In addition, the risks to global aggregated economic growth due to the climate change impacts are projected to be lower at 1.5 ◦C than at 2 ◦C by the end of this century.

Carbon dioxide has the most substantial effect on global warming [8]. Although it was once assumed to have an ~100 year lifespan in the atmosphere, careful studies revealed that the situation is far worse, with three-quarters of the gas expected to remain for a time in the region of up to ~1000 years, with the remainder lasting for an indefinite period of time [9]. It was indicated that the present impacts of humanity on the atmosphere can certainly cause a long term problem [10]. Carbon dioxide is released when oil, coal, and other fossil fuels are burnt for the energy we use to power our homes, cars, and smartphones. By lessening its usage, we can curb our own contribution to climate change while saving money. The first challenge is eliminating the burning of coal, oil, and, eventually, natural gas. Oil is the lubricant of the global economy as it is hidden inside such ubiquitous items as plastic and corn, fundamental to the transportation of both consumers and goods. Coal is the substrate, supplying roughly half of the electricity worldwide, a percentage that is likely to grow according to the International Energy Agency (IEA). In fact, buildings contribute up to 43% of all the greenhouse gas emissions worldwide [11], even though investing in thicker insulation and other cost-effective as well as temperature-regulating strategies can save money in the long run. Investment in new infrastructures, or radical upgradation of the existing highways and transmission lines, may help to reduce greenhouse gas emissions, yielding economic growth in the developing countries.

Nations across the globe have kept very high targets to reducing their GHG discharges [12,13]. In order to meet these goals, considerable reductions in city energy usage is required. At a global scale, urban communities represent over half (55%) of the population, which is predicted to reach 68% by the middle of this century [14]. Urban areas claim ownership of the highest levels of energy use, gas emission, and also the largest local economy. As such, it is crucial for urban areas to reduce their consumption and utilize renewable sources wherever available to reduce their gas discharge levels. Smart cities often utilize digital sensors to measure and transmit data about the levels of GHGs in the city at that moment, as a means of tackling them [15]. The efficacy of such a system is thus reliant on the network used to collate and analyze the data collected as an extant network. The mobile telecommunications networks offer a convenient solution to this desire, as their pre-existence has the clear benefit of reducing costs compared to the design and implementation of a novel system. It is recognized that smart cities will certainly act as the key players meeting these ambitious targets [16,17]. In this study, we focused primarily on the potential applications of 5G network technology to control climate change in Singapore. In addition, a clear overview of the sustainability benefits of introducing 5G technology compatible smart cities, buildings, and farms in all aspects of urbanization is provided. Herein, the main purpose is to tackle the negative outcomes associated with anthropogenic climate change, with a particular focus on the contributions that are best made by the telecoms network operators.

Climate change is one of the most challenging problems that humanity has ever faced. Presently, hundreds of millions of lives, innumerable species, entire ecosystems, health, economy, and the future habitability of this planet are at risk. Fortunately, climate change is solvable, we just need to wisely exploit the existing technologies and sciences. Climate change mitigation is a pressing international need in which many management actions are required. The development of 5G technology has been largely driven by smart mobile devices and advanced communication technologies. It may thus serve as a technical enabler for a whole new range of business opportunities, energy, and facilities management, together with industrial applications. Moreover, it may enable different devices to work together seamlessly. Definitely, the 5G cellular network technology is expected to revolutionize the global industries with profound effects on the savings of energy, waste generation and recycling, and water resources management, thus reducing the climate change impacts.

#### Indicts of systemic holdup are wrong.

Shapiro & Lemley 20, \*Carl Shapiro is the Transamerica Professor of Business Strategy Emeritus at the Haas School of Business, University of California at Berkeley; \*Lemley is the William H. Neukom Professor at Stanford Law School and a partner at Durie Tangri LLP; (2020, “THE ROLE OF ANTITRUST IN PREVENTING PATENT HOLDUP”, https://faculty.haas.berkeley.edu/shapiro/patentholdup.pdf)

C. Actual Patent Holdups Are Very Difficult to Measure

As with holdup in general, quantifying the frequency and magnitude of actual patent holdups is very difficult as a practical matter and not a useful way of assessing the importance of the patent holdup problem. Rarely can researchers observe the ex post price, because patent licensing terms are normally confidential. Even when researchers can observe the license fees, they are often embedded in a complex agreement. And even in those rare cases where researchers can accurately observe the ex post price, they are unlikely to observe the ex ante price, making it difficult if not impossible to measure the magnitude of the holdup.

Litigated cases also are problematic as a source of data to quantify the magnitude of actual patent holdups. A litigated case resulting in an award of reasonable royalties may well involve attempted holdup, but by definition it cannot provide smoking-gun evidence of actual holdup, at least if one accepts that the royalties awarded by the court are reasonable.64 Rather, at least since the Supreme Court eliminated the automatic entitlement to an injunction, litigation to judgment (which is rare) often reflects a refusal to give in to holdup by a defendant willing to take its chances in court. And the vast majority of patent cases settle. The terms of a settlement are rarely observable, so it is impossible to know whether those settlements reflected the value of holdup.

Notwithstanding these points, a number of authors have pointed to a lack of empirical evidence to argue that patent holdup either does not exist or is not a significant problem.65 Even taken on their own terms, many of these papers are deeply flawed. One such paper, which has often been cited by those who downplay the importance of patent holdup, purports to offer empirical evidence inconsistent with the hypothesis that SEP holdup has slowed innovation or harmed consumers.66 The conclusion to this Qualcomm-funded paper states, “[w]e cannot reject the hypothesis of no SEP holdup.”67 How do these authors reach this conclusion? They compare rates of change of quality-adjusted prices in “SEP- reliant” industries with “similar” non-SEP-reliant industries, primarily over the 1997-2013 period.68 For example, they show that quality-adjusted prices of cellular phones have fallen faster than the quality-adjusted prices of automobiles.69 This exercise does not address the relevant hypothesis: whether SEP holdup increased the price of cellular phones from what it otherwise would have been.70 The quality- adjusted prices of pharmaceuticals have risen much faster than automobiles over the same period of time, but that similarly is not proof that pharmaceuticals are subject to a patent holdup problem.

Beyond the obvious and fatal flaws in this empirical work,71 the whole line of inquiry is of limited relevance for the purpose of measuring the social costs of holdup or designing institutions to limit patent holdup, because it only looks for instances of actual patent holdup. As explained above, these instances are very difficult to detect and are only the tip of the iceberg in terms of the social costs of patent holdup.72 So far as we can tell, the vast majority of these papers have been funded by Qualcomm and other patent holders seeking to weaken the institutions designed to control patent holdup, increase their leverage in licensing negotiations, and thus increase their ability to monetize their patents.73

Despite the difficulties of observing the incidence and magnitude of actual patent holdups, we are able to observe the telltale signs of actual patent holdup. Transaction cost economics, and simple bargaining theory for that matter, tell us that actual patent holdup can be expected to occur when three conditions are present: (1) a firm has developed a new product independently; (2) that firm has made significant investments that are specific to one or more patents asserted against that product; and (3) the firm is not protected from patent holdup.74 As discussed above, conditions (1) and (2) are common in the high-tech sector, placing considerable weight on the institutions that protect firms from patent holdup.

The presence of those institutions is itself evidence that the patent holdup problem is real and significant. As we noted in Part I, companies try to structure their transactions to avoid holdup, developing institutions for that purpose. As we have seen, the traditional market solutions do not work well for patents. In most industries, the central mechanisms limiting patent holdup come from patent law, namely the rules governing injunctions and patent damages. In the high-tech sector, companies have overwhelmingly turned to SSOs in an effort to obtain global commitments to an ex ante royalty, which appear in the form of FRAND commitments. The near-universal recognition in the industry of the need for such a mechanism is strong evidence that companies view holdup as a problem they must build institutions to avoid.

#### Countervailing studies sidestep relevant hypothesis.

Melamed & Shapiro 18, \*A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School; \*Carl Shapiro is the Transamerica Professor of Business Strategy at the Haas School of Business at the University of California at Berkeley; (May 2018, “How Antitrust Law Can Make FRAND Commitments More Effective”, https://www-cdn.law.stanford.edu/wp-content/uploads/2018/05/How-Antitrust-Law-Can-Make-FRAND-Commitments-More-Effective.pdf)

B. Addressing the Patent Holdup Skeptics

Several arguments have been advanced in support of imposing less stringent or no restraints on SEP holders. These arguments are deeply flawed, both empirically and theoretically.

First, some who oppose rigorous enforcement of effective FRAND commitments rely on studies that purport to show that concerns about ex post opportunism leading to excessive royalties are unfounded.20 However, those studies lack proper controls and therefore do not show what they purport to show— namely, that aggregate royalty costs have not hindered innovation or commercialization. The basic shortcoming of these studies is that they do not offer a sensible but-for world in the absence of opportunism as a comparator by which to assess observed behavior. For example, noting that cell phone technology has advanced rapidly in recent years does not prove a lack of costly opportunism by the owners of SEPs for the thousands of technologies included in cell phones.21

Nor do the studies even purport to show that individual holders of asserted patents are not excessively compensated, or rebut the hypothesis that the prospect of such excessive compensation has created perverse incentives for over-patenting and other welfare-reducing strategies.

### 1AC---Cybersecurity Advantage

#### Advantage two is Cybersecurity:

#### Exclusionary patent strategies create structural flaws in 5G standardization that imperil cybersecurity---competition reduces vulnerability and severity of attacks.

Duan 20, \*Charles Duan is a senior fellow and associate director of tech & innovation policy at the R Street Institute, where he focuses his research on intellectual property issues; (2020, “OF MONOPOLIES AND MONOCULTURES: THE INTERSECTION OF PATENTS AND NATIONAL SECURITY”, Santa Clara High Technology Law Journal, 36(4), 369-405. Retrieved from <https://www2.lib.ku.edu/login?url=https://www.proquest.com/scholarly-journals/monopolies-monocultures-intersection-patents/docview/2442966690/se-2?accountid=14556>)

III. COMPETITION AND CYBERSECURITY

In addition to the historical review done so far, another approach to understanding the relationship among patents, competition, and national security is to consider the role of cybersecurity. There is little doubt that computer system vulnerabilities that enable hacking and spread of computer exploits are a threat to the nation’s defenses, so better cybersecurity is a key part of national security strategy.155

Strong competition can thus complement national security by enhancing domestic cybersecurity, and patent assertion that unduly weakens competition detracts from cybersecurity.156 Competition promotes better cybersecurity in at least two ways. First, multiple studies show that competition encourages firms to improve their products on multiple vectors including cybersecurity. Second, competition avoids a situation that security experts call a “monoculture,” which increases vulnerability to severe cyberattacks. As former Secretary of Homeland Security Michael Chertoff wrote recently, “We need competition and multiple providers, not a potentially vulnerable technological monoculture,” to guarantee national security.157 Thus, cybersecurity provides a useful lens for understanding how unfettered patent assertion and licensing can detract from national security.

A. Cybersecurity as Competitive Value-Add

Competition enhances national security by reducing the incidence of technical vulnerabilities. That effect is especially important for security sensitive systems such as mobile telecommunications.

Intuitively, a causal chain from competition to cybersecurity makes logical sense. Computer security is a value-added benefit to consumers, so firms in competitive markets are likely to use security to gain an edge over their competitors.158 In monopolized markets, though, there may be less external impetus to test products for flaws, and the monopolist may choose to focus less on security and more on new product features or increased product quality.

Economic research confirms these hypotheses about competition leading to better cybersecurity. A 2009 empirical study of web browsers considered the impact of market concentration on the amount of time that vendors took to fix security vulnerabilities as they were discovered.159 The study found that the presence of more competitors correlated with faster cybersecurity response—a reduction of 8–10 days in response time per additional market rival.160 Similarly, business researchers in 2005 modeled incentives for firms to engage in sharing of cybersecurity information, and concluded that the “inclination to share information and invest in security technologies increases as the degree of competitiveness in an industry increases.”161 Another study found that, where two software firms are in competition, at least one will be willing to take on some degree of risk and responsibility for cybersecurity, whereas a monopoly software firm will consistently fail to accept such responsibility.162 To be sure, an unpublished study from 2017 found that some market concentration can make firms more responsive to cybersecurity issues, but only to a point: “being in a dominant position reduces the positive effect of having less competitors on the responsiveness of the vendor,” and indeed the “more dominant the firm is, the less rapid it is in releasing security patches.”163 This research confirms that competition is more conducive to cybersecurity.

It is not hard to see how this applies to emerging communication technologies markets. In the absence of competition, the above research suggests that device manufacturers, chip makers, and software developers will lack incentives to respond to vulnerabilities, to share information about cybersecurity practices and issues, and to take responsibility for security matters. Mobile phone chips have had their share of cybersecurity failures already.164 The best way to flush out ongoing and future cybersecurity issues is to maintain competitive pressure at all levels of the supply chain.

B. Vulnerabilities of “Monocultures”

A second reason why monopoly undermines cybersecurity is that monopoly leads to a “monoculture” of single-vendor products, opening the door to massive systemic failure in the case of a cyberattack. Computer researchers developed the theory of software monocultures in the early 2000s, in response to the regular phenomenon of computer viruses and other attacks spreading rapidly by exploiting flaws in the dominant operating system at the time, Microsoft Windows.165 Where a computer system such as Windows has a commanding share of users, a virus that exploits a flaw in that system can quickly spread to infect a whole interconnected ecosystem. An operating system monopoly thus enables fast and easy spread of cyberattacks, and better cybersecurity would be achieved through greater diversity in online systems.166 As one research group posited, “a network architecture that supports a collection of heterogeneous network elements for the same functional capability offers a greater possibility of surviving security attacks as compared to homogeneous networks.”167

There has been considerable study of the theory that computer monocultures are naturally more vulnerable to attacks.168 In one study, computer science researchers reviewed a catalog of 6,340 software vulnerabilities recorded in 2007, to compare whether comparable software would share the same flaws.169 Of the 2,627 vulnerabilities applicable to application software (as opposed to operating systems, web scripts, and other software components), only 29 (1.1%) applied to substitute products from different vendors but providing the same functionality.170 By contrast, different versions of a single software product were found to share vulnerabilities 84.7% of the time.171 Thus, software monocultures share exploitable flaws even when there is some variation in versions across the monoculture; by contrast, diversity in software is almost guaranteed to prevent a single flaw from affecting all users.

In the case of 5G and wireless mobile communications, a monoculture is an especially concerning possibility. To the extent that systems such as smart city sensors or communication networks are widely deployed in a monoculture fashion, a widespread attack could have devastating consequences, potentially blacking out a region and affecting essential services such as 911.172 A monoculture that is vulnerable to so-called “rootkits” or “backdoors”—maliciously installed software that enable bad actors to commandeer systems—could also enable mass surveillance or spying by private hackers or foreign governments.173 The presence of systems from multiple vendors would mitigate these possibilities.

#### Actors have means and motivations to strike critical infrastructure.

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Among critical infrastructure sectors in the U.S., energy is perhaps the most crucial of the 16 sectors defined by the Department of Homeland Security. This sector is so vital because it provides the energy necessary to run every other critical infrastructure sector. However, the U.S. power grid, the backbone of the energy sector, is built upon an aging skeleton that is becoming increasingly vulnerable every day. Whether from terrorists or nation-states like Russia and China, the power grid is susceptible to not just physical attacks, but also to cyber intrusion as well. However, much of this threat can be mitigated if the U.S. takes the appropriate steps to safeguard the power grid and avoid a potential catastrophe in the future.

Since Sept. 11, 2001, terrorism on U.S. soil has been at the forefront of American consciousness. Critical infrastructure provides an appealing target because of the disproportionally large impact even a small attack can have on the sectors. In particular, the power grid represents a particularly lucrative target, both in terms of the ease of access and the large impact it can make. The National Research Council stated that the U.S. power grid is “vulnerable to intelligent multi-site attacks by knowledgeable attackers intent on causing maximum physical damage to key components on a wide geographical scale.”[[1]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn1) Additionally, the physical security of transmission and distribution systems is difficult due to the dispersed nature of these key components, which in turn is advantageous to attackers as it reduces the likelihood of their capture.[[2]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn2) From 2002-2012, approximately 2,500 physical attacks occurred against transmission lines and towers worldwide and approximately 500 attacks against transformer substations.[[3]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn3) Terrorists have the motivation to attack the U.S. power grid but the very nature of the grid makes it highly vulnerable. The power grid is not only at risk from physical attacks, but also nation-state cyberattacks.

One nation that has shown both the capability and intent to use attacks against critical energy infrastructure is Russia, as demonstrated in their 2015 annexation of Crimea from Ukraine. A Russian cyber threat group known as Sandworm, which used its BlackEnergy malware, attacked Ukrainian computer systems that provide remote control of the Ukraine power grid.[[4]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn4) This attack, and another in 2016, each left the capital Kiev without power, prompting cyber experts to raise concern about the same malware already existing in NATO and the U.S. power grids.[[5]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn5) In any conflict between Russia and NATO, not only would similar cyberattacks pose a threat, but so would potential physical attacks severing fuel oil and natural gas lines to Western Europe. Russia has both the capability and intent to attack critical infrastructure, particularly power grids, during future conflicts in their “hybrid warfare” approach.

Another nation that has the capability to attack critical energy infrastructure is China, representing a threat to not just the U.S. energy infrastructure but also that of our allies whose support would be vital in a major conflict. A recent NATO report highlighted this threat from China’s Belt and Road Initiative, stating that “[China’s] foreign direct investment in strategic sectors [such as energy generation and distribution] …raises questions about whether access and control over such infrastructure can be maintained, particularly in crisis when it would be required to support the military.”[[6]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn6) Like Russia, China has been active with cyber intrusions in U.S. energy infrastructure. The Mission Support Center at Idaho National Laboratory characterized these as attacks as “multiple intrusions into US ICS/SCADA [Industrial Control Systems/Supervisory Control and Data Acquisition] and smart grid tools [that] may be aimed more at intellectual property theft and gathering intelligence to bolster their own infrastructure, but it is likely that they are also using these intrusions to develop capabilities to attack the [bulk electric system], as well.”[[7]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn7) China, therefore, has both the capability and intent to conduct cyber intrusions and attacks for myriad reasons.

Another arm of this threat is the reliance the U.S. energy industry has on imports from China, especially transformers. In early 2020, federal officials seized a transformer in the port of Houston that had been imported by the Jiangsu Huapeng Transformer Company before sending it to Sandia National Laboratory in Albuquerque. Sandia is contracted by the U.S. Department of Energy for mitigating national security threats.[[8]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn8) The Wall Street Journal reported that “Mike Howard, chief executive of the Electric Power Research Institute, a utility-funded technical organization, said that the diversion of a huge, expensive transformer is so unusual – in his experience, unprecedented – that it suggests officials had significant security concerns.”[[9]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn9) Previously destined for the Washington Area Power Administration’s Ault, Colo., substation, the transformer is believed to have been seized due to “backdoor” exploitable hardware emplaced by the Chinese prior to shipment.[[10]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn10) Shortly after these events, President Trump issued Executive Order 13920, “[Securing the United States Bulk-Power System](https://trumpwhitehouse.archives.gov/presidential-actions/executive-order-securing-united-states-bulk-power-system/),” essentially limiting the import of Chinese-built critical energy infrastructure components due to concerns about cybersecurity.[[11]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn11) Interestingly, Jiangsu Huapeng “boasted that it supported 10 percent of New York City’s electricity load.”[[12]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn12)

Franklin Kramer, the former Assistant Secretary of Defense for International Security Affairs, testified before a U.S. House of Representatives Energy and Commerce subcommittee during an energy and power hearing in 2011 and said that a “highly-coordinated and structured cyber, physical, or blended attack on the bulk power system, however, could result in long-term (irreparable) damage to key system components in multiple simultaneous or near-simultaneous strikes.” He added that “an outage could result with the potential to affect a wide geographic area and cause large population centers to lose power for extended periods.”[[13]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn13) Even the inclusion of features such as smart grids to the overall grid structure poses new vulnerabilities through their connectivity. Kramer stated that “such connectivity means that the distribution system could be a key vector for a national security attack on the grid.”[[14]](https://www.hstoday.us/subject-matter-areas/infrastructure-security/perspective-cyber-and-physical-threats-to-the-u-s-power-grid-and-keeping-the-lights-on/" \l "_ftn14)

#### Those attacks cause accidental nuclear escalation.

Klare 19, \*Michael T. Klare is a professor emeritus of peace and world security studies at Hampshire College and senior visiting fellow at the Arms Control Association; (November 19th, “Cyber Battles, Nuclear Outcomes? Dangerous New Pathways to Escalation”, https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation)

Yet another pathway to escalation could arise from a cascading series of cyberstrikes and counterstrikes against vital national infrastructure rather than on military targets. All major powers, along with Iran and North Korea, have developed and deployed cyberweapons designed to disrupt and destroy major elements of an adversary’s key economic systems, such as power grids, financial systems, and transportation networks. As noted, Russia has infiltrated the U.S. electrical grid, and it is widely believed that the United States has done the same in Russia.[12](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote12) The Pentagon has also devised a plan known as “Nitro Zeus,” intended to immobilize the entire Iranian economy and so force it to capitulate to U.S. demands or, if that approach failed, to pave the way for a crippling air and missile attack.[13](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote12)

The danger here is that economic attacks of this sort, if undertaken during a period of tension and crisis, could lead to an escalating series of tit-for-tat attacks against ever more vital elements of an adversary’s critical infrastructure, producing widespread chaos and harm and eventually leading one side to initiate kinetic attacks on critical military targets, risking the slippery slope to nuclear conflict. For example, a Russian cyberattack on the U.S. power grid could trigger U.S. attacks on Russian energy and financial systems, causing widespread disorder in both countries and generating an impulse for even more devastating attacks. At some point, such attacks “could lead to major conflict and possibly nuclear war.”[14](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote14)

These are by no means the only pathways to escalation resulting from the offensive use of cyberweapons. Others include efforts by third parties, such as proxy states or terrorist organizations, to provoke a global nuclear crisis by causing early-warning systems to generate false readings (“spoofing”) of missile launches. Yet, they do provide a clear indication of the severity of the threat. As states’ reliance on cyberspace grows and cyberweapons become more powerful, the dangers of unintended or accidental escalation can only grow more severe.

#### Cyber-compromised NC3 causes nuclear war.

Klare 19, \*Michael T. Klare is a professor emeritus of peace and world security studies at Hampshire College and senior visiting fellow at the Arms Control Association; (November 19th, “Cyber Battles, Nuclear Outcomes? Dangerous New Pathways to Escalation”, <https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation>)

The Nuclear-Cyber Connection

These links exist because the NC3 systems of the United States and other nuclear-armed states are heavily dependent on computers and other digital processors for virtually every aspect of their operation and because those systems are highly vulnerable to cyberattack. Every nuclear force is composed, most basically, of weapons, early-warning radars, launch facilities, and the top officials, usually presidents or prime ministers, empowered to initiate a nuclear exchange. Connecting them all, however, is an extended network of communications and data-processing systems, all reliant on cyberspace. Warning systems, ground- and space-based, must constantly watch for and analyze possible enemy missile launches. Data on actual threats must rapidly be communicated to decision-makers, who must then weigh possible responses and communicate chosen outcomes to launch facilities, which in turn must provide attack vectors to delivery systems. All of this involves operations in cyberspace, and it is in this domain that great power rivals seek vulnerabilities to exploit in a constant struggle for advantage.

The use of cyberspace to gain an advantage over adversaries takes many forms and is not always aimed at nuclear systems. China has been accused of engaging in widespread cyberespionage to steal technical secrets from U.S. firms for economic and military advantages. Russia has been accused, most extensively in the Robert Mueller report, of exploiting cyberspace to interfere in the 2016 U.S. presidential election. Nonstate actors, including terrorist groups such as al Qaeda and the Islamic State group, have used the internet for recruiting combatants and spreading fear. Criminal groups, including some thought to be allied with state actors, such as North Korea, have used cyberspace to extort money from banks, municipalities, and individuals.[4](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote04) Attacks such as these occupy most of the time and attention of civilian and military cybersecurity organizations that attempt to thwart such attacks. Yet for those who worry about strategic stability and the risks of nuclear escalation, it is the threat of cyberattacks on NC3 systems that provokes the greatest concern.

This concern stems from the fact that, despite the immense effort devoted to protecting NC3 systems from cyberattack, no enterprise that relies so extensively on computers and cyberspace can be made 100 percent invulnerable to attack. This is so because such systems employ many devices and operating systems of various origins and vintages, most incorporating numerous software updates and “patches” over time, offering multiple vectors for attack. Electronic components can also be modified by hostile actors during production, transit, or insertion; and the whole system itself is dependent to a considerable degree on the electrical grid, which itself is vulnerable to cyberattack and is far less protected. Experienced “cyberwarriors” of every major power have been working for years to probe for weaknesses in these systems and in many cases have devised cyberweapons, typically, malicious software (malware) and computer viruses, to exploit those weaknesses for military advantage.[5](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote05)

Although activity in cyberspace is much more difficult to detect and track than conventional military operations, enough information has become public to indicate that the major nuclear powers, notably China, Russia, and the United States, along with such secondary powers as Iran and North Korea, have established extensive cyberwarfare capabilities and engage in offensive cyberoperations on a regular basis, often aimed at critical military infrastructure. “Cyberspace is a contested environment where we are in constant contact with adversaries,” General Paul M. Nakasone, commander of the U.S. Cyber Command (Cybercom), told the Senate Armed Services Committee in February 2019. “We see near-peer competitors [China and Russia] conducting sustained campaigns below the level of armed conflict to erode American strength and gain strategic advantage.”

Although eager to speak of adversary threats to U.S. interests, Nakasone was noticeably but not surprisingly reluctant to say much about U.S. offensive operations in cyberspace. He acknowledged, however, that Cybercom took such action to disrupt possible Russian interference in the 2018 midterm elections. “We created a persistent presence in cyberspace to monitor adversary actions and crafted tools and tactics to frustrate their efforts,” he testified in February. According to press accounts, this included a cyberattack aimed at paralyzing the Internet Research Agency, a “troll farm” in St. Petersburg said to have been deeply involved in generating disruptive propaganda during the 2016 presidential elections.[6](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote06)

Other press investigations have disclosed two other offensive operations undertaken by the United States. One called “Olympic Games” was intended to disrupt Iran’s drive to increase its uranium-enrichment capacity by sabotaging the centrifuges used in the process by infecting them with the so-called Stuxnet virus. Another left of launch effort was intended to cause malfunctions in North Korean missile tests.[7](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote07) Although not aimed at either of the U.S. principal nuclear adversaries, those two attacks demonstrated a willingness and capacity to conduct cyberattacks on the nuclear infrastructure of other states.

Efforts by strategic rivals of the United States to infiltrate and eventually degrade U.S. nuclear infrastructure are far less documented but thought to be no less prevalent. Russia, for example, is believed to have planted malware in the U.S. electrical utility grid, possibly with the intent of cutting off the flow of electricity to critical NC3 facilities in the event of a major crisis.[8](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote08) Indeed, every major power, including the United States, is believed to have crafted cyberweapons aimed at critical NC3 components and to have implanted malware in enemy systems for potential use in some future confrontation.

Pathways to Escalation

Knowing that the NC3 systems of the major powers are constantly being probed for weaknesses and probably infested with malware designed to be activated in a crisis, what does this say about the risks of escalation from a nonkinetic battle, that is, one fought without traditional weaponry, to a kinetic one, at first using conventional weapons and then, potentially, nuclear ones? None of this can be predicted in advance, but those analysts who have studied the subject worry about the emergence of dangerous new pathways for escalation. Indeed, several such scenarios have been identified.[9](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote09)

The first and possibly most dangerous path to escalation would arise from the early use of cyberweapons in a great power crisis to ~~paralyze~~ undermine the vital command, control, and communications capabilities of an adversary, many of which serve nuclear and conventional forces. In the “fog of war” that would naturally ensue from such an encounter, the recipient of such an attack might fear more punishing follow-up kinetic attacks, possibly including the use of nuclear weapons, and, fearing the loss of its own arsenal, launch its weapons immediately. This might occur, for example, in a confrontation between NATO and Russian forces in east and central Europe or between U.S. and Chinese forces in the Asia-Pacific region.

Speaking of a possible confrontation in Europe, for example, James N. Miller Jr. and Richard Fontaine wrote that “both sides would have overwhelming incentives to go early with offensive cyber and counter-space capabilities to negate the other side’s military capabilities or advantages.” If these early attacks succeeded, “it could result in huge military and coercive advantage for the attacker.” This might induce the recipient of such attacks to back down, affording its rival a major victory at very low cost. Alternatively, however, the recipient might view the attacks on its critical command, control, and communications infrastructure as the prelude to a full-scale attack aimed at neutralizing its nuclear capabilities and choose to strike first. “It is worth considering,” Miller and Fontaine concluded, “how even a very limited attack or incident could set both sides on a slippery slope to rapid escalation.”[10](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote10)

What makes the insertion of latent malware in an adversary’s NC3 systems so dangerous is that it may not even need to be activated to increase the risk of nuclear escalation. If a nuclear-armed state comes to believe that its critical systems are infested with enemy malware, its leaders might not trust the information provided by its early-warning systems in a crisis and might misconstrue the nature of an enemy attack, leading them to overreact and possibly launch their nuclear weapons out of fear they are at risk of a preemptive strike.

“The uncertainty caused by the unique character of a cyber threat could jeopardize the credibility of the nuclear deterrent and undermine strategic stability in ways that advances in nuclear and conventional weapons do not,” Page O. Stoutland and Samantha Pitts-Kiefer wrote in 2018 paper for the Nuclear Threat Initiative. “[T]he introduction of a flaw or malicious code into nuclear weapons through the supply chain that compromises the effectiveness of those weapons could lead to a lack of confidence in the nuclear deterrent,” undermining strategic stability.[11](https://www.armscontrol.org/act/2019-11/features/cyber-battles-nuclear-outcomes-dangerous-new-pathways-escalation#endnote11) Without confidence in the reliability of its nuclear weapons infrastructure, a nuclear-armed state may misinterpret confusing signals from its early-warning systems and, fearing the worst, launch its own nuclear weapons rather than lose them to an enemy’s first strike. This makes the scenario proffered in the 2018 NPR report, of a nuclear response to an enemy cyberattack, that much more alarming.

#### Cracking down on anticompetitive patent licensing reintroduces cybersecurity enhancing competition.

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IV. LESSONS AND POLICY DIRECTIONS

The above discussion shows that patent protection can have mixed effects on national security: On the one hand, patents can encourage innovation that ensures domestic technological leadership and produces useful security-protective technologies; on the other hand, patents can stifle innovation-producing and cybersecurity-enhancing competition and can stymie the government’s own ability to achieve national security goals. To navigate the complex effects of patent policy on national security, policymakers may consider the following recommendations as guideposts.

A. Anticompetitive Patent Licensing

An area of particular concern should be the use of patents and patent licensing strategies to diminish competition or put up roadblocks to new entrants. Policymakers should certainly not support these abuses of the patent system, and indeed should take steps to prevent them.

In the mobile communications space, patent licensing already plays an outsized role. There are reportedly between 250,000 and 314,000 patents on the smartphone alone, and litigation over cell phone technologies has lasted decades by now. Patents will thus inevitably have an impact on technologies like 5G or the Internet of Things, so the question is what that impact will be.

Patents are supposed to encourage innovation, but research finds that patents alone will not do so; competition is another requirement. A 2015 study considered the impact of competition policy and patent strength on innovation among European firms, measured in terms of research and development spending.183 Initially, the study compared firms in countries with strong patent laws against those in countries with weaker patent laws, and found that patent protection has “no effect on R&D intensity,” a conclusion consistent with multiple other studies.184 However, the study found that when a major competition reform went into effect, strong-patent countries enjoyed a boost in innovation greater than that experienced in weak-patent countries.185 In other words, strong patent protection is complementary to strong competition; the former does not promote innovation without the latter. The practical import of this research is that patent protection is beneficial up to a point, but to the extent that patents—or, more commonly, legal strategies involving patents—overreach to suppress competition, that overreach should be cause for concern.

Yet today, strategic patent behavior contrary to competition is prevalent. The Federal Trade Commission’s ongoing lawsuit against mobile phone chip manufacturer Qualcomm, for example, challenges Qualcomm’s practice of refusing to sell chips to any phone manufacturer who does not first pay a hefty sum for patent licenses—even if the manufacturer does not actually have need for all those licenses.186 To the extent that Qualcomm’s “no license, no chips” practice is in fact anticompetitive—that is what the courts overseeing the case will decide—monopolization of that market could substantially harm cybersecurity for the reasons noted above.187 The company’s about-50% market share in the advanced mobile chip market 188 means that there is a virtual monoculture of Qualcomm chips already, and there are ongoing concerns about security vulnerabilities in those chips.189 It is thus puzzling that some have opposed the FTC litigation on the grounds that it is making the United States “less competitive in the global 5G arms race.”190 As one scholar explains, this rhetoric “smacks of ‘national champion’ thinking” and ultimately fails to ensure that “national security warnings are being balanced against competitive imperatives.”191

With respect to emerging information technologies, policymakers should be concerned that a leading firm could undertake similar patent licensing strategies to control the market. Indeed, the district court in the Qualcomm litigation found that Nokia and Ericsson already “have imitated Qualcomm’s practice” because it is “more lucrative.”192

### 1AC---Plan

#### Plan: The United States federal judiciary should substantially increase prohibitions on private sector conduct that is more restrictive of competition than reasonably necessary to enable creation of information technology standards.

### 1AC---Solvency

#### Solvency.

#### The plan solves.

Melamed & Shapiro 18, \*A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School; \*Carl Shapiro is the Transamerica Professor of Business Strategy at the Haas School of Business at the University of California at Berkeley; (May 2018, “How Antitrust Law Can Make FRAND Commitments More Effective”, https://www-cdn.law.stanford.edu/wp-content/uploads/2018/05/How-Antitrust-Law-Can-Make-FRAND-Commitments-More-Effective.pdf)

3. Application of the Basic Legal Principles

The antitrust principle is straightforward: industry-wide collaboration through SSOs to establish procompetitive standards is permitted only if it is no more restrictive of competition than reasonably necessary to enable creation of the standards. When standard setting predictably creates technology monopolies that, if unrestrained, will enable anticompetitive ex post opportunism that would otherwise not occur, an SSO that does not take effective measures to prevent or minimize such ex post opportunism engages in conduct that is more restrictive of competition than necessary. In that case, the SSO and, in appropriate cases, its members, may well violate Section 1 of the Sherman Act.

Under this principle, SSO procedures and FRAND rules should be evaluated based on whether they lead to reasonable SEP royalties, using the competitive ex ante licensing standard discussed above, which has been adopted by the courts in patent law. Put differently, FRAND rules should be evaluated based on their ability to prevent SEP holders from obtaining more than the ex ante value of their technology from implementers.

This limitation would not prevent a SEP holder from proﬁting, perhaps greatly, from participating in the SSO and having its patented technology included in the standard. The SEP holder continues to be rewarded for its technology because the inclusion of its technology in the standard can still greatly increase the volume of licensing opportunities available to the SEP holder.

Whether a particular set of FRAND rules are sufficiently effective in preventing ex post opportunism will depend on the particular circumstances. The procedural unfolding of the case will also depend upon the circumstances. As a general matter, the case would probably be structured as an ordinary Rule of Reason case.82

First, the plaintiff would have to demonstrate harm to competition as a result of the collaboration of the SSO’s members, many of which compete with one another. In this case, the harm to competition would stem from the ability of the SEP holder to exercise monopoly power by obtaining royalties in excess of the competitive, ex ante level. The decision to include patented technologies in the standard would be the allegedly unlawful agreement. Notably, the court need not determine what a FRAND royalty is; it would suffice to determine that market power has been created or exercised, and that existing SSO rules and policies were not adequate to prevent the competitive harm. The defendant, which could be the SSO or perhaps one or more SSO members, would win at this point if the plaintiff failed to show harm to competition. If might fail if the standard faces substantial competition and the court concludes that the SEP holder therefore does not have market power or if the SSO’s rules and policies are found to be effective in preventing ex post opportunism, even if the plaintiff or even the court thinks that other rules and policies would be preferable.

Second, if the plaintiff makes the requisite showing of harm to competition, the defendant(s) would then have to show some procompetitive justiﬁcation— in this case, the beneﬁts of the standard. These two initial steps should be straightforward.

Third, if as is likely the defendant is able to show a procompetitive justiﬁcation, the plaintiff would have to show that the SSO could have used available, reasonable alternatives to realize the efficiency beneﬁts with less or none of the competitive harms. The plaintiff might identify reasonable alternatives that would have led to a different standard, based on including unpatented technology in the standard or perhaps involving fewer SEPs or fewer owners of SEPs, which would be less subject to patent holdup. More likely, the plaintiff could suggest alternative SSO rules that would not change the standard, but would reduce the likelihood or extent of ex post opportunism. For example, the plaintiff might suggest more rigorous FRAND-type rules, such as rules that set forth more precise principles on which FRAND royalties are to be determined and the circumstances under which SEP holders might seek injunctions.

Fourth, the burden would then shift to the defendant(s) to show that the beneﬁts of the standard could not have been realized if the SSO had adopted any of the proffered alternatives or that those alternatives were unrealistic.83 The plaintiff would be entitled to judgment if the court concludes that those beneﬁts could have been realized with less competitive harm if the SSO had adopted the standard with different IPR rules or policies.

Our overall sense, based on experience and the empirical literature, is that the extant FRAND rules are generally useful, but tend to be inadequate because they are imprecise and leave unresolved such critical issues as (a) the meaning of a reasonable royalty, even conceptually; (b) the meaning of “non-discriminatory;” (c) to whom licenses must be offered; and (d) under what circumstances may a SEP holder obtain an injunction.84 These imprecise FRAND commitments are therefore not sufficient to adequately prevent ex post opportunism. The recent revisions to IEEE’s FRAND policy represent a signiﬁcant step in the right direction, but even this advance leaves important questions unanswered.85 If FRAND rules are inadequate in these ways, litigation involving extant FRAND rules would likely be resolved only at the ﬁnal, fourth step. The defendant would be able to demonstrate the beneﬁts created by the standard; the plaintiff would be able to demonstrate the creation of market power and that other reasonable and practical rules or policies would ameliorate the problem. The case would thus turn on whether the defendant is able to demonstrate that signiﬁcant beneﬁts associated with standardization could not have been realized if the SSO had adopted those other rules or policies.

The court would have available a variety of possible remedies if the plaintiff prevails. Implementers that paid supracompetitive royalties or were unlawfully excluded in whole or in part from product markets as a result of the inadequate FRAND policies would be entitled to damages and, in some cases, to treble damages.86 If the unlawful SSO conduct is regarded as the collective action of the SSO and its members, which is likely to be the case in most instances, SSO members would be jointly and severally liable for the damages. Forward-looking injunctive relief aimed at restoring competition would need to be fashioned to the requirements of the individual case. For example, a court could order the SSO to adopt a new rule or policy proposed by the plaintiff. If the court is reluctant to take on that governance role, it might give the SSO a period of time—maybe ninety days—to develop a rule, subject to the court’s ultimate approval, which would adequately ameliorate the competitive problem created by the SSO. Alternatively or in addition, the court might order the parties to attempt to negotiate a rule or policy on which they can agree. And, depending on the circumstances, the court might order SEP holders, including at least those that were defendants in the case, to comply with the new SSO rules and policies.

#### Only antitrust enforcement creates a consumer-action feature that challenges SSO misconduct.

Melamed & Shapiro 18, \*A. Douglas Melamed is Professor of the Practice of Law at Stanford Law School; \*Carl Shapiro is the Transamerica Professor of Business Strategy at the Haas School of Business at the University of California at Berkeley; (May 2018, “How Antitrust Law Can Make FRAND Commitments More Effective”, <https://www-cdn.law.stanford.edu/wp-content/uploads/2018/05/How-Antitrust-Law-Can-Make-FRAND-Commitments-More-Effective.pdf>)

2. Why Antitrust Enforcement Is Necessary

Some SSO members have an interest in ensuring that the SSO takes steps to minimize the potential harms from the SEP holders’ monopoly power, and this undoubtedly explains in part why most SSOs have adopted FRAND policies or similar requirements. But, as shown in the economic model in the Appendix,73 SSOs cannot in general be counted on to adopt effective FRAND policies. The bases for this conclusion, which is central to our argument for the applicability of Section 1 to SSO FRAND rules, can be summarized as follows.74

First, the SSO members collectively have an interest in permitting SEP holders to charge supracompetitive royalties that elevate the downstream price of compliant devices to the monopoly level. Doing so will enable the members in aggregate to collect increased revenues from consumers, and thus to generate increased profits that in theory could be shared by all the members. In other words, supracompetitive royalties can enrich industry participants as a group at the expense of final consumers. This fact alone should serve as a clear and strong signal regarding the dangers of counting on SSOs to implement effective FRAND policies: if the SSO members negotiate efficiently, the outcome will be just as bad for consumers as if the members agreed to fix downstream prices.75 The fundamental problem is that final consumers are not at the table when the SSO rules are negotiated.

Second, SSO members that own SEPs but earn little or no profits as implementers have a powerful self-interest in being able to exercise the ex post monopoly power associated with their SEPs. Because SSO policies are usually determined by a consensus process, these members will likely be able to block the adoption of fully effective FRAND policies. Moreover, these SSO members often have the greatest interest in SSO patent policies. Since much of their income may be attributable to patent licensing, they can be expected to devote substantial resources to block the adoption of FRAND policies that effectively prevent patent holdup.

Third, even SSO members that earn significant profits as implementers may have mixed incentives if they also own SEPs, which can also lead to weak or in-effective FRAND rules. In the Appendix, we show that, if the requisite share of votes in the SSO are cast by firms whose share of SEP royalties is at least as large as their share of downstream profits, and if these firms can coordinate their voting over the FRAND rules, then an SSO unconstrained by antitrust laws will establish FRAND rules leading to an outcome no better for consumers than would result from an integrated monopolist controlling all SEPs and all downstream sales.76

Fourth, even SSO members that are downstream implementers and own few, if any, SEPs may have only a modest interest in promoting effective policies to restrict ex post opportunism. Because all implementers will be subject to the opportunism, all of them will face increased licensing costs, and therefore will likely be able to pass on most or all of the increased costs to their customers.77 Furthermore, these implementers might not be especially active or effective in the standard-setting process for free-riding or public-good reasons, especially if SEP royalties constitute only a relatively small portion of the costs of their standard-implementing products. Public choice theory predicts that the highly motivated SEP holders are likely to have the greatest influence over patent policies.

Empirical evidence bears out these concerns. As a starting point, we find it striking that SSO FRAND rules are almost always quite vague.78 Notably, SSOs in which SEP holders are more prevalent tend to have weaker FRAND rules.79 Further, to our knowledge, SSOs have made almost no effort to enforce their FRAND rules and have, instead, left enforcement efforts to others.80 This evidence raises serious doubts about the effectiveness of the existing FRAND rules in preventing ex post opportunism.

#### Threatening antitrust liability lures SSO’s into adopting best practices.

Lemley & Shapiro 13, \*Mark Lemley is the William H. Neukom Professor at Stanford Law School and a partner at Durie Tangri LLP; \*Carl Shapiro is the Transamerica Professor of Business Strategy at the Haas School of Business, University of California at Berkeley and a Senior Consultant at Charles River Associates; (2013, “A SIMPLE APPROACH TO SETTING REASONABLE ROYALTIES FOR STANDARD-ESSENTIAL PATENTS”, (https://faculty.haas.berkeley.edu/shapiro/frand.pdf)

Under our approach, many of these issues should become moot, since the patentee cannot obtain an injunction (or transfer the patent to someone who can) against a willing licensee, and since competitors are not involved in jointly setting the reasonable royalty rate. If SSOs set clear, reasonable rules following the best practices we recommend, and parties follow those rules, there should be little or no need for antitrust to intervene. Indeed, even the risk of non-disclosure of a patent is lessened, since the patentee has committed to license its essential patents whether or not it discloses them. For the most part, the rules we have described are self-executing, meaning that even if a party tries to break the rules set by the SSO there still may be no need for antitrust to intervene. Thus, we suggest that parties who abide by these procedures—patentees, implementers, and the SSOs themselves—should be immune from antitrust liability for activities that merely follow those rules.107 They have entered into an arrangement that is on balance good for competition, one that allows patentees to receive reasonable royalties but prevents holdup and reduces the risk of monopolization by trickery.

The fact that antitrust remains a last resort available when SSOs don’t follow best practices may have two practical benefits, however. First, under our approach the promise of avoiding the risk of antitrust liability will be a powerful incentive for both SSOs and patent owners to adopt the best practices we propose. Second, the risk of antitrust liability may be relevant when an individual patentee wants to adopt best practices but the SSO governing the standard has not yet done so. We propose that a patentee that unilaterally commits to the FRAND procedures we describe here should be immune from antitrust liability for following these procedures.108 A patentee’s unilateral binding commitment to arbitration could be enforced whether or not it was elicited by an SSO. Thus, just as the prospect of antitrust immunity might lure SSOs to adopt best practices, it might also lure patentees to implement those practices even if the SSO has not done so. Given the large number of standard-essential patents based on preexisting standards,109 and given that SSOs tend to update their IP rules rather slowly,110 this is not a small matter.

# 2AC

## Advantage 1

### 2AC---LD---Patent Holdout

#### Patent holdout is incoherent and anti-empirical---a) copying is unlikely b) no market rewards patent holders for sunk capital and c) the patent system solves---which is NOT the case for holdup.

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E. The Patent Holdout Chimera

Patent advocates have sought to deflect concerns about patent holdup not only by denying its existence but by concocting a supposedly parallel story of “patent holdout.” On this theory, patent owners are being deprived of the fruits of their R&D investments by implementers who copy their technology but refuse to pay. The idea is to tell a story that parallels patent holdup.91

Patent holdout is incoherent as a theoretical matter and rejected as an empirical matter. Empirically, between 95% and 99% of patent defendants in the IT industry are not in fact copying anything.92 They are independent inventors.93 Indeed, as we have seen, it is quite often impossible to know whether someone else invented the same thing you did at around the same time until years after the fact. Coupled with the notorious vagueness of IT patents94 and the sheer number of them, patent holdout does not explain what goes on in the technology industry unless it means failing to predict which of 500,000 patents, many of which you cannot see, will someday be asserted against technology you have developed yourself even though you have never heard of the inventor and they never built anything. That is not to say that there are never cases of deliberate copying, but they are a tiny fraction of patent suits in the IT industry.

The problems with patent holdout run far deeper than that, however. According to the patent holdout theory, the patent holder is unfairly disadvantaged because it has incurred the sunk costs of developing its invention before it can negotiate with an alleged infringer. But this is precisely how innovation in the private sector is intended to work in the presence of a patent system. The reward to an inventor is based on the incremental value of its invention, not on the amount of money expended to achieve that invention or the risk involved.95 A major invention can earn enormous profits even if it did not involve large R&D expenditures, and a patented invention may have no commercial value, even if it was very expensive to develop.

Those who express concerns about patent holdout seem to want to increase the returns to patent holders whose inventions add little or no incremental value. That’s simply not how the patent system works or is intended to work. Indeed, doing so would create perverse incentives for companies to seek patents with holdup power rather than to fund R&D programs leading to technological advances.

The patent holdout theory boils down to a complaint that basing patent damages on reasonable royalties is not favorable enough to patent holders; that they should be entitled to capture all the social value that traces in some way to their technology.96 But no property gives its owner the right to all related social surplus, and no market works that way. On top of all that, the patent holdout view seems rooted in the stilted view that all innovation comes in the form of patents. That proposition is disproven by a large literature and impressive body of evidence showing that a great deal of the creation, adoption, and diffusion of new technologies does not take place in the form of patents.97

Those pushing the theory of patent holdout as parallel to patent holdup also misunderstand the actual operation of the patent system. Patent holdup, like any kind of holdup, occurs because the party engaging in patent holdup, namely the patent owner, has the law on its side and can therefore shut down the defendant’s conduct unless the defendant pays a surcharge. But there is no similar legal right of the party supposedly engaging in patent holdout to infringe a patent. To the contrary, the law gives patent owners the right to sue for an injunction (if they are practicing entities) and, in any event, for damages adequate to compensate for the infringement.98 While courts may have difficulty calculating those damages, they tend to err on the side of paying patent owners too much, not too little.99 Plus, a defendant deliberately infringing a patent must also pay punitive damages for willful infringement,100 and often attorneys’ fees as well.101 Some companies may try to “hold out” by infringing a patent and refusing to pay reasonable royalties, but the law can and does call them to account for it. Patent holdout might be a worry if we did not have a patent system, but that system by design prevents patent holdout.102

It is true that a group of companies might conspire together to drive down the price of inputs, just as they might form a cartel to raise their own prices. These “buyers’ cartels” are a legitimate worry of antitrust law.103 But a single company developing a product it made and defending itself in a later patent suit is not a buyers’ cartel. Nor is a group of companies that responds to the danger of patent holdup, not by refusing to pay or by setting an artificially low price, but by agreeing with the patent owners themselves to pay the price patent law would rightfully charge them anyway—a FRAND royalty.

### UQ---Tech Competition

#### The U.S. will lose the 5G race now---China’s Huawei is poised to dominate standard-setting.

Clark 21, \*Laurie Clark is a senior reporter at Tech Monitor. Before this, she held reporting positions at NS Tech, Wired UK and IDG. She holds an undergraduate degree in psychology from UCL and a masters in media and journalism from the University of Glasgow; (June 23rd, 2021, “‘Technical standards-setting is shaping up to be the next China-US showdown”, https://techmonitor.ai/technology/technical-standards-setting-shaping-up-next-china-us-showdown)

In China’s Standards 2035 plan, unveiled last year, the country outlined its intentions to dominate the next generation of technologies by taking a pivotal role in setting technical standards. According to Beijing, “third tier” companies make products; “first tier” companies set standards. It wants to be a champion of the latter.

The plan is seen as intrinsic to China’s ambitions for supremacy in emerging fields such as AI, quantum, the internet of things, 5G and 6G. Those ambitions reflect the commonly held belief that we are on the precipice of a fourth industrial revolution, says Richard Ghiasy, senior fellow at the Leiden Asia Centre in The Netherlands. “What we’ve seen in the previous three iterations, is that the nation or nations that lead that revolution generally tend to lead the world and the world economy,” he says.

Unsurprisingly, China’s Standards 2035 plan has attracted pushback from the US, which sees it as a threat to Western dominance of global technology markets. President Joe Biden has said the US should become more involved in standards-setting – casting it as a bulwark to China’s growing influence and power. As such, digital standards-setting is shaping up to be the latest battleground in the geopolitical tussle between the US and China that increasingly focuses on technology.

“For two and a half centuries, international technology standards have been an engine for wealth creation and dominance largely belonging to the West,” [wrote Shawn Kim](https://www.scmp.com/comment/opinion/article/3134216/china-standards-2035-how-china-plans-win-future-its-own), head of the Asia Technology research team at Morgan Stanley, in response to the Standards 2035 plan strategy. “However, this is now changing.”

US vs China: the geopolitics of technical standards

Technical standards allow products to work together across different jurisdictions and manufacturers. A prime example is the USB cable, which replaced multiple different types of cords; another is the plug socket, which takes different forms around the world. If each country or company uses its own standards, technologies are not easily interoperable with those made by other countries or companies.

Usually, standards are set by a consortia of industry-leading companies and international industry associations. Standards can emerge from convention, or the market dominance of a particular supplier, or from formal agreements, depending on the industry and product. China missed the opportunity to participate in the standards-setting of the first wave of technologies, including mobile technologies and internet infrastructure. The current industrial revolution is a chance for the nation to remedy that.

One of the most successful examples of China’s efforts to play a leading role in standards-setting is 5G. China’s influence on global 5G standards is mediated through the world-leading status of Huawei, China’s national telecoms champion. Huawei is more advanced in 5G than its western competitors such as Nokia and Ericsson or eastern counterparts Samsung and Fujitsu.

This has made the company an important actor in setting technical standards for 5G. Huawei holds the largest number of “standards-essential patents” required to make 5G work, followed by Nokia and Samsung, according to research provider IPLytics. The company [also leads](https://www.wsj.com/articles/from-lightbulbs-to-5g-china-battles-west-for-control-of-vital-technology-standards-11612722698) in standards proposals to the 3rd Generation Partnership Project (3GPP), an umbrella group of standards organisations that develop protocols for mobile telecommunications – one-quarter of which have been approved.

Huawei’s indispensability for 5G is reflected in the fact that, although the US has successfully pressured allied countries like the UK and Australia to cut the company’s technology out of their networks, others – including Germany – have hesitated to exclude the company entirely. In another admission of Huawei’s heft, the US allowed American companies [to continue working](https://asia.nikkei.com/Spotlight/Huawei-crackdown/US-to-allow-companies-to-work-with-Huawei-on-5G-standards) with the company on setting 5G standards after it was placed on a US trade blacklist, for fear that US companies would no longer have a place at the table otherwise.

But 5G isn’t the only technology that Beijing aims to be instrumental in setting, or updating, the standards for. Chinese navigation satellite systems company, BeiDou, is increasingly competing with GPS, which is owned and operated by the US government. It is more accurate in some regions than existing satellite technology, says Ghiasy, and countries such as Pakistan have shifted from GPS to BeiDou. Ghiasy's research has highlighted e-commerce systems, primarily through the influence of Chinese online shopping giant Alibaba, fintech, and smart city technologies, as areas where China is also exerting considerable influence over standards-setting.

Another ambitious project approach to rewriting international standards came in the form of a Huawei proposal for [a new internet protocol](https://www.ft.com/content/ba94c2bc-6e27-11ea-9bca-bf503995cd6f). Huawei claims that it is being developed solely to meet the technical requirements of an increasingly digital world, and has not woven in any particular governance model. But critics have warned it could integrate a system of centralised control into the internet. Countries such as Saudi Arabia, Iran and Russia have reportedly shown an interest in such alternative network technologies.

Influencing the standards-setting process

One way China promotes its vision for the technical specifications of the future is by increasing its presence at global standards organisations. Chinese officials now lead four such bodies, including the International Telecommunication Union, a specialised agency of the United Nations responsible for information and communication technologies, and the International Electrotechnical Commission, an industry association that publishes international standards for electrical, electronic and related technologies.

Another means of exerting influence is through China’s Digital Silk Road (DSR) project, a subset of the country’s Belt and Road Initiative (BRI). The DSR focuses on setting up digital or technological infrastructure in partner countries. Smart city infrastructure is particularly popular – [according to](https://www.ft.com/content/188d86df-6e82-47eb-a134-2e1e45c777b6) RWR Advisory, Chinese companies have secured 116 deals to install smart city packages globally since 2013, 70 of which are in BRI countries.

Through the DSR, China can incentivise countries to adopt its technical standards, making it too costly and laborious for them to shift to different standards later. The initiative combines government powers with industry-leading companies such as Tencent and Alibaba, says Ghiasy. "It is very much a whole-of-government plus whole-of-private-sector approach, and there are some subsidies and some policy facilitation. It is a more powerful combination, a more effective one at lower rates, than what we generally can offer [to countries] here in the West."

Both the US and Europe have baulked at China’s recent push to influence global technical standards. “To some extent, history is repeating itself," says Paul Timmers, research associate at the University of Oxford and former European Commission director for Digital Society, Trust and Cyber Security. "In the '90s, the US was upset that it got bypassed by planned action of European companies in telecoms frequency allocation and realised it had not kept its eye on the ball; today it is both the USA and Europe who painfully realise that to have been naïve or sleeping, while China was moving forward."

Even greater than the geopolitical struggle between the US and China is the battle between two economic models: free-market capitalism and state capitalism. The US hugely benefited from its technological dominance over the past half-century, and the ample investment and political weight that came with that. “However, the US has funnelled the profits from that huge global advantage into private bank accounts of a small number of people, perhaps at the expense of reinvesting in next-generation technology,” says Madeline Carr, professor of global politics and cybersecurity at UCL. “And that is most clearly evident in the reality now that the US has no viable player in the 5G market.”

Writing in the South China Morning Post, Morgan Stanley's Kim [observes](https://www.scmp.com/comment/opinion/article/3134216/china-standards-2035-how-china-plans-win-future-its-own) that China's current approach is not a historical aberration. “Most nations that drove industrialisation did so via capital and government support... Industrialisation in Germany and Japan was top-down driven, and the US semiconductor industry was formed by state funding for military and space projects.”

The US appears keen to redress the recent lack of federal tech investment with a massive chunk of funding poised to be signed off under the US Innovation and Competition Act. But sceptics [aren’t certain this will be enough](https://techmonitor.ai/policy/massive-us-tech-bill-needs-aim-more-than-countering-china) to make up ground in key technological areas where China is set to accelerate ahead.

### 2AC---Not to Late to Solve Warming

#### It’s not too late to solve warming---rapid cuts avert existential catastrophe.

Mark Fischetti 21, senior editor at Scientific American, BS in Physics from the University of New York at Albany, 10/2/2021, “There’s Still Time to Fix Climate—About 11 Years,” https://www.scientificamerican.com/article/theres-still-time-to-fix-climate-about-11-years/

In October 31 world leaders will descend on Glasgow, Scotland, for the United Nations Climate Change Conference, or COP26, in a last-ditch effort to defuse the [climate emergency](https://www.scientificamerican.com/article/we-are-living-in-a-climate-emergency-and-were-going-to-say-so/) by limiting global warming to less than 1.5 degrees Celsius. Reaching that level would still bring [violent storms](https://www.scientificamerican.com/article/vapor-storms-are-threatening-people-and-property/), deep flooding, gripping droughts and problematic sea-level rise, but it would avert even more severe consequences. Global temperature has risen by nearly 1.1 degrees C since the industrial revolution. A clear understanding of how emissions affect temperature shows that there is still time to reach the political agreements, economic transformations and public buy-in needed to sharply cut emissions, limit temperature rise and limit destruction. Nations can duck the 1.5-degree ceiling if they make deep cuts now. As of July 30, commitments to reduce emissions by the 191 nations that signed the 2015 Paris Climate Accord would permit 2.7 degrees of warming by 2100, according to a report issued in September by the secretariat of the U.N. Framework Convention on Climate Change, the group that coordinates ongoing pledges to the Paris Accord. The charge for the COP26 meeting is to eliminate the gap. Here’s what needs to happen. The first step is to get rid of an old idea that the public, the media and policymakers are not clear on—the notion that even if humans stopped emitting carbon dioxide overnight, inertia in the climate system would continue to raise temperature for many years. Because CO2 can persist in the atmosphere for a century or more, the argument goes, even if the concentration stopped rising, temperature would keep going up because the heat-trapping mechanism is already in place. In other words, some level of future warming is “baked into” the system, so it’s too late to avoid the 1.5-degree threshold. ADVERTISEMENT But scientists discounted that idea at least a decade ago. Climate models consistently show that “committed” (baked-in) warming does not happen. As soon as CO2 emissions stop rising, the atmospheric concentration of CO2 levels off and starts to slowly fall because the oceans, soils and vegetation keep absorbing CO2, as they always do. Temperature doesn’t rise further. It also doesn’t drop, because atmospheric and ocean interactions adjust and balance out. The net effect is that “temperature does not go up or down,” says Joeri Rogelj*, director of research at the Grantham Institute—Climate Change and Environment at Imperial College London.* The good news is that if nations can cut emissions substantially and quickly, warming can be held to less than 1.5 degrees. Credit: Amanda Montañez; Source: IPCC, 2018: *Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty,* edited by V. Masson-Delmotte et al. Intergovernmental Panel on Climate Change To avoid that threshold, the world can emit only a set amount of CO2 from now into the future. This quantity is known as the carbon budget. In 2019, the year before the COVID pandemic depressed the global economy, the world discharged about 42 gigatons of CO2—similar to the 2018 level and to what is happening in 2021. According to the midrange scenario in the Intergovernmental Panel on Climate Change’s comprehensive report released in August, “Climate Change 2021: The Physical Science Basis,” another 500 gigatons of CO2 emissions will raise global temperature by 1.5 degrees. Nations have about 11 more years at current emissions rates—2032—before exhausting the budget. That threshold moves further into the future, however, if countries significantly reduce their output very soon. Aggressive policies, enacted now, can create more time and more hope for preventing catastrophe. In a 2018 report, the IPCC stated that the world had to achieve net-zero carbon emissions by 2050

to keep warming to 1.5 degrees. To get on that track, the September U.N. report says, nations have to cut emissions in half by 2030. Every year of delay brings the world much closer to the edge of the precipice. “We are not trying to hit the temperature targets,” says Rogelj, who is also a sen*ior research scholar at the International Institute for Applied Systems Analysis and a key author of the 2021 IPCC report.* “We are trying to stay as far away from the edge as possible.” Credit: Amanda Montañez; Source: [*Climate Change 2021: The Physical Science Basis: Summary for Policymakers*. Working Group 1 to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press (in press)](https://www.ipcc.ch/report/ar6/wg1/#SPM) DEGREES OF RISK If nations fall short and the temperature rise surpasses 1.5 degrees, it will still be crucial to make immediate and ongoing reductions to stay below 2.0 degrees of warming, a level at which scientists say impacts become more dire and exceedingly difficult for societies to cope with. To avoid that threshold, the world can emit only another 1,350 gigatons of CO2, according to the August IPCC report. At 42 gigatons a year, that happens by 2052. Again, if countries greatly reduce emissions soon, that date extends forward, too. If countries do not make significant reductions this decade, the subsequent cuts needed to limit temperature rise to 2.0 degrees will be much tougher to achieve. “Every single year that passes imposes a huge penalty for the future reductions that would be required,” says Josep Canadell, chief research scientist at CSIRO, Australia’s national science agency, and a lead author of the 2021 IPCC report. It is also important to understand, Rogelj says, that each added 10th of a degree of warming beyond 1.5 degrees brings greater risk of damaging weather, sea-level rise and other ills to more ecosystems and more people, especially the most vulnerable. He likens the increasing risk to jumping from a platform that today may be a meter high: healthy adults might hit the ground without injury, but small children and the elderly will get hurt. Each additional 10th of a degree raises the platform. “At two meters,” Rogelj says, “many more people are likely to get injured. And at a certain height, everyone will be severely harmed.” The IPCC’s carbon budget analysis includes a measure of uncertainty—roughly 15 percent up or down. And the midrange scenario means nations have a 50 percent chance of keeping warming to 1.5 degrees if they restrict future emissions to 500 gigatons. To improve the odds to 83 percent, the IPCC says, the budget drops to 300 gigatons. The numbers get even tighter if nations continue to burn down rain forests because there will be less vegetation drawing CO2 from the atmosphere. Countries have to consider societal factors as well, such as being sure to spread any economic challenges from emissions cuts fairly on citizens. Of course, if the world reduced emissions only marginally and never reaches net zero, “atmospheric CO2 concentration will continue to increase, and temperature will continue to rise,” says Susan Solomon, a professor of environmental studies and atmospheric chemistry at the Massachusetts Institute of Technology, who has contributed to many climate change reports. HUMAN LAG The dialogue leading up to COP26, where countries will try to encourage one another to commit to greater emissions reductions, is focused on CO2. But the atmosphere is affected by other greenhouse gases such as methane and nitrous oxide, by climate feedbacks such as disappearing sea ice, and by aerosols—small pollution particles released primarily from the burning of fossil fuels. If CO2 emissions remain at current levels, but [methane emissions](https://www.scientificamerican.com/article/u-s-and-e-u-pledge-to-cut-methane-emissions-but-obstacles-abound/) rise and other feedbacks get stronger, the world will warm by 1.5 degrees before 2032 and by 2.0 degrees before 2052. The IPCC scenarios include some level of additional warming from these factors. They do not include any so-called negative emissions by machines that pull CO2 from the sky, because the economic viability of those systems is just too uncertain, Canadell says. Credit: Amanda Montañez; Source: [*Climate Change 2021: The Physical Science Basis: Summary for Policymakers*. Working Group 1 to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press (in press)](https://www.ipcc.ch/report/ar6/wg1/#SPM) The U.N. report uses a different metric to account for other greenhouse gases, called CO2-equivalent—a quantity that represents warming from CO2 as well as methane, nitrous oxides and other gases such as hydrofluorocarbons. But its analyses parallel the IPCC’s. As of July 30, the U.N. report says, 113 of the 191 nations that signed the Paris Accord had made some level of commitment to reduce emissions. Under the latest promises, global emissions by 2030 would actually be 5.0 percent higher than in 2019—not lower—in the midrange scenario the IPCC uses. The report notes that emissions from the nations that have issued revised goals since 2015, as a group, would indeed be lower in 2030 compared with 2019, so the net increase worldwide would come from the countries that have not improved their original commitments and countries that have never committed. At current emissions rates, the U.N. report says, the world would use up 89 percent of the remaining 1.5-degree budget by 2030 and 39 percent of the 2.0-degree budget by 2030. On October 25, a week before COP26 begins, the secretariat was to count any additional country updates made since July 30. Eyes will be on the G20 nations—19 nations plus the European Union that together account for about 90 percent of gross world product. The G20 nations are responsible for about three quarters of global emissions, according to Taryn Fransen, a senior fellow at the World Resources Institute who studies nations’ long-term climate strategies. She is eager to hear how countries will fulfill their promises, known as nationally determined contributions, or NDCs. The net-zero goals are important, Fransen says, “but each country has to actually get there.” To get there, nations have to jump—now. Some scientists are starting to use the old climate change language to highlight what has to be done. The warming factor that is baked in “is human infrastructure,” Solomon says. If countries let the current stocks of coal plants, natural gas facilities, transportation systems, industrial complexes and buildings live out their natural lifetimes, they commit to a certain amount of additional warming. There is also a lag time in stopping temperature rise, she notes, “a lag in human action—the slow response of people to the problem.” The practical question, says Raymond Pierrehumbert, head of the Planetary Climate Dynamics Group at the University of Oxford, is: How quickly can the world scrub greenhouse gases out of the global economy?

## T-Exemption

### 2AC---T-Exemption

#### C/I: ‘Scope’ refers to activity at the present time, not the abstract potential application of law.

Clement ’16 [Frank; March 3; Judge on the Tennessee Court of Appeals; Court of Appeals of Tennessee at Nashville, “Hamer v. Southeast Res. Group, Inc,” Lexis 176]

When interpreting a contract, ordinary words typically have their ordinary meanings unless there is evidence [\*13] that the parties intended for the words to have a special meaning. Madson v. Madson, 636 So. 2d 759, 761 (Fla. Dist. Ct. App. 1994). The ordinary meaning of a word is often described as its meaning in the dictionary. See Siegle v. Progressive Consumers Ins. Co., 788 So. 2d 355, 360 (Fla. Dist. Ct. App. 2001); Beans v. Chohonis, 740 So. 2d 65, 67 (Fla. Dist. Ct. App. 1999). The ordinary meaning of a word or phrase is also described as "a natural meaning or the meaning most commonly understood when considered in relation to the subject matter and circumstances." See J.N. Laliotis Eng'g Constr. v. Mastor, 558 So. 2d 67, 68 (Fla. Dist. Ct. App. 1990) (quoting Granados Quinones v. Swiss Bank Corp., 509 So. 2d 273, 275 (Fla. 1987)).

If parties wish to depart from the ordinary meaning of common words and assign uncommon meanings to them, they must do so explicitly. See Madson, 636 So. 2d at 761. "One who would ascribe an exotic meaning to a term in a contract which otherwise has perfectly ordinary connotations must take pains to define the term either expressly or by express reference." E. Ins. Co. v. Austin, 396 So. 2d 823, 825 (Fla. Dist. Ct. App. 1981); see Russ v. State, 832 So. 2d 901, 907 (Fla. Dist. Ct. App. 2002) ("[W]here a statute does not specifically define words of common usage, such words are construed in their plain and ordinary sense." (alteration in original)); Koplowitz v. Imperial Towers Condo., Inc., 478 So. 2d 504, 505 (Fla. Dist. Ct. App. 1985) ("Whether they appear in a statute or in a declaration of condominium, words of common usage should be construed in their plain and ordinary sense.").

Here, this dispute exists because the parties' agreement does not define "scope" or "scope and purpose." Furthermore, the agreement does not identify the point in time when the "scope" of [\*14] Action's business is to be determined. Southeast contends that "scope and purpose" is ambiguous because it is susceptible to multiple reasonable interpretations. According to Southeast, "scope and purpose" means "at a minimum any business opportunity to be marketed to credit union members, including the telemedicine opportunity." However, the entirety of the parties' agreement and the "inconvenience, hardship, or absurdity" that would result from Southeast's proposed interpretation demonstrate that the agreement is not ambiguous and that the parties intended for the words "scope and purpose" to have their ordinary meanings. See Branscombe, 76 So. 3d at 948.

"Scope" and "purpose" are commonly-used words with commonly-understood meanings. Therefore, if the parties intended to ascribe an uncommon meaning to "scope" or "scope and purpose," they should have explicitly defined those terms. See E. Ins. Co., 396 So. 2d at 825. Instead of explicitly stating that these words have an uncommon definition, the agreement provides that its terms, covenants, and provisions "shall be construed simply and according to [their] fair meaning[s] . . . ." Consequently, the failure to specify a unique meaning for "scope and purpose" and the inclusion of the above-quoted section [\*15] indicate that the parties intended for these words to have their ordinary meanings. See id.; see also Russ, 832 So. 2d at 907; Koplowitz, 478 So. 2d at 505.

Under Southeast's interpretation, Plaintiff agreed to disclose and make available every business opportunity "to be marketed to credit union members." Such a broad definition appears to encompass every product or service imaginable, whether they have anything to do with Action or not. Under this interpretation, Plaintiff would be required to disclose an opportunity to sell cars to credit union members even though Action's business is not related to cars at all. The inconvenience, hardship, or absurdity that would result are weighty evidence that the parties did not intend for "scope and purpose" to have this meaning, especially when interpreting the agreement based on the ordinary meaning of "scope" avoids these difficulties. See Branscombe, 76 So. 3d at 948 HN9 ("The inconvenience, hardship, or absurdity of one interpretation of a contract or its contradiction of the general purpose is weighty evidence that such meaning was not intended when the language is open to an interpretation which is neither absurd nor frivolous and is in agreement with the general purpose of the parties.").

HN10 The ordinary meaning of words is found in the dictionary and is the most commonly understood meaning in relation to the subject matter of the parties' agreement. See Siegle, 788 So.2d at 360; Beans, 740 So. 2d at 67; J.N. Laliotis, 558 So. 2d at 68. According to one dictionary, "scope" means "1. The range of one's perceptions, thoughts, or actions. 2. Breath or opportunity to function. 3. The area covered by a given activity or subject." The American Heritage College Dictionary 1222 (3d ed. 1997). The operating agreement is concerned with the relationship of Action's members to each other and to Action, and the subject matter of section 6.6 is the duty to make certain business opportunities available to Action in order to avoid competition between Action and its members. [\*18] Based on the dictionary and the subject matter of the parties' agreement, "scope" most naturally refers to the range or breadth of the business that Action is engaged in at the relevant time.

Southeast contends this interpretation renders "purpose" redundant because "by definition, scope would always be within the purpose." We respectfully disagree. Contrary to Southeast's contentions, "scope" and "purpose" refer to different concepts. "Purpose" is aspirational and refers to what Action is capable of doing in the future (i.e. all lawful business for limited liability companies). In contrast, "scope" refers to what Action actually is doing or has done at the relevant point in time. Thus, an opportunity might be within Action's scope but not its purpose if, for example, Action had been organized for a limited purpose (e.g. to acquire real estate in Florida) but was in fact also engaged in the business of selling disposable mobile phones to college students. In this example, a business opportunity to sell mobile phones to college students would be within Action's scope but not its purpose.

Therefore, under the ordinary meaning of "scope," a member is required to disclose a business opportunity [\*19] if that opportunity (1) is within Action's aspirational goal — its purpose; and (2) is within the area that Action's business has or is actually covering at the relevant point in time. As a result, interpreting "scope" according to its ordinary meaning does not render any part of the agreement redundant.

Having concluded that "scope" refers to the breadth of the business Action is or has engaged in, we must turn our attention to determining when Action's "scope" should be assessed. The agreement does not specify whether Action's scope is to be determined as of the date of the agreement, the date of the discovery of an opportunity, or some other date. After reviewing the agreement, we conclude that the parties intended for Action's scope to be determined at the time when a member seeks to pursue the business opportunity in question.

#### ‘Expand’ extends.

Murphy ’47 [Loren E; September 18; Chief Justice on the Supreme Court of Illinois; Westlaw, “Fed. Elec. Co. v. Zoning Bd. of Appeals of Vill. of Mt. Prospect,” 398 Ill. 142]

The question is squarely presented as to whether the placing of the neon signs on the towers expanded the use to which the property had been previously devoted. The restrictive part of the ordinance which prohibits expansion refers to the nonconforming \*\*362 use of the property. Literally, it provides that the use may be continued but it cannot be \*146 expanded. Webster's International Unabridged Dictionary defines the word ‘expand,’ to extend, to enlarge. The application of such definition to the word ‘expanded’ as contained in section 10 would mean that the use that was being conducted on the premises at the time of the adoption of the ordinance could not be extended or enlarged. The placing of the neon signs on the towers did not expand or enlarge the use to which the property was devoted. It may have been installed for advertising purposes, hoping that it would result in a gain of its business, but there is nothing in the record which indicates that such advertising would be followed by any expansion or enlargement of the laboratory experiments that were being conducted on the property. Zenith had the right to continue its nonconforming use and the right to advertise that use and the products it was handling, so long as it did not expand the use to which the property was devoted when the ordinance was adopted.

## Prizes CP

### 2AC---Prices CP

#### CP collapses the economy—they read the DA for us

John 1NC Raidt 14, Vice President, Jones Group International Scholar, U.S. Chamber of Commerce Foundation Senior Fellow, Atlantic Council, "Patents and Biotechnology", US Chamber of Commerce Foundation, https://www.uschamberfoundation.org/patents-and-biotechnology

The biotechnology industry is vital to human progress and America’s economy. The sector depends heavily on the incentive provided by patents to rationalize the enormous risk of investing in life science research and development (R&D). These risks pay off for society by generating solutions that help diagnose, prevent, and treat diseases and disorders; improve human health and food production; and provide greater energy security, water development, and environmental protection. These accomplishments, moreover, create well-paying jobs and drive global competitiveness. Despite these positive attributes, questions and controversies are emerging at the nexus of biotechnology and our patent system. These challenges will have significant impact on a wide array of scientific disciplines, including molecular biology, biotechnology, embryology, genetics, and bioinformatics. Indeed, these are sectors in which the United States has a comparative advantage that must be maintained. How well society addresses these issues will significantly influence the state of our economy and creative capacities for years to come.

#### Positive incentives fail and rely on federal monitoring for implementation.

Haber et al. 17, \*Eldar Haber, Senior Lecturer, University of Haifa, Faculty of Law; Haifa Center for Law and Technology, University of Haifa, Faculty of Law; Faculty Associate, Berkman-Klein Center for Internet & Society, Harvard University; \*\*Tal Zarsky, Vice Dean and Professor, University of Haifa, Faculty of Law; Haifa Center for Law and Technology, University of Haifa, Faculty of Law. (Winter 2017, “Cybersecurity for Infrastructure: A Critical Analysis”, https://ir.law.fsu.edu/cgi/viewcontent.cgi?article=2578&context=lr)

The ideas we discuss directly above focus on measures to internalize negative externalities, which have proven to be ineffective. We can approach the issue from a different avenue: by providing direct and indirect incentives to CI operators who sufficiently adapt to cyber challenges.198 Incentives can take the form of direct payments for meeting cybersecurity standards,199 a right to participate in government tenders,200 or tax benefits based on criteria related to cybersecurity measures. In addition to incentivizing their implementation, the state could provide cybersecurity tools and assistance to CI operators without charge.

However, such direct incentives also insufficiently incentivize implementing adequate CI cybersecurity measures. Even with such incentives in place, some CI operators might decide that their implementation is not worthwhile after considering the potential costs of applying such protective measures and their interference with CI operations. Furthermore, this type of policy may face political opposition. The public, who in many cases is dissatisfied with public utilities/private CIs, may oppose the redirection of its taxpayer money to these firms’ pockets for services the CIs are expected to provide and that are already paid for. And again, the success of the model relies on the state’s ability to set cybersecurity standards and monitor their implementation—a practice that, as we shall see shortly, generates substantial problems.

## DA

### 2AC---ET DA

#### Extraterritorial cases in the context of SEPs and FRAND are already happening and coming now BUT the affirmative’s switch to an *ex ante* approach is necessary to reverse course

Contreras 19’ — Jorge L. Contreras (Professor of Law, University of Utah); “THE NEW EXTRATERRITORIALITY: FRAND ROYALTIES, ANTI-SUIT INJUNCTIONS AND THE GLOBAL RACE TO THE BOTTOM IN DISPUTES OVER STANDARDS-ESSENTIAL PATENTS;” Boston University Journal of Science & Technology Law; Volume 25, No. 2; https://www.bu.edu/jostl/files/2019/10/1.-Contreras.pdf

C. Race to the Courthouse

This jurisdictional race to the bottom will, by design, result in particular jurisdictions’ rules favoring one party or another in litigation. It is likely to encourage a party to initiate litigation in the most favorable jurisdiction possible, as quickly as possible, often to foreclose a later suit in a less favorable jurisdiction. This situation is referred to as a “race to the courthouse,”240 and may prematurely drive parties to litigation rather than negotiation or settlement. Far from being a mere theoretical possibility, such races are not only observed, but actively encouraged, by law firms that represent clients in multijurisdictional patent litigation.241 Take, for example, one such firm’s recommendation that its clients adopt a “first strike strategy” by initiating patent litigation in the most favorable jurisdiction based on data compiled from about thirty different national judicial venues.242

Scholars have also identified numerous procedural and substantive differences among U.S. jurisdictions that have driven forum selection decisions and the impetus to file quickly in those jurisdictions.243 And even though courts criticize such jurisdictional races as “disorderly” attempts at “procedural fencing,”244 most courts (at least in U.S. patent cases) typically defer to the choice of forum made by the first party to file, further encouraging parties to engage in such races to the courthouse.245

In response to the UK High Court’s fashioning of a global patent license for the parties in Unwired Planet I, on appeal Huawei raised the specter of such an international race to the courthouse.246 That is, if national courts are empowered to establish global royalty rates and other terms for private FRAND licenses, a veritable parade of horribles could ensue:

[I]mplementers may be faced with the threat of injunctions which effectively deprive them of their ability to defend their FRAND positions before the courts of the territories where the relevant SEPs subsist; courts will set rates for [patents] over which they have no jurisdiction; the judgment of a single court in a jurisdiction in which an implementer does not wish to litigate may create a res judicata as between it and the [patent] owner in relation to the terms of a global licence, and this might be very unfair.247

However, the Court of Appeal rejected these arguments, finding “nothing unfair” about allowing “a court in one country [to] decide, as between the parties, whether a global or multi-territorial licence is FRAND.”248 In particular, the court held that a single court’s determination of a global license “does not deprive a licensee from challenging the validity and essentiality of [patents] in any [other] jurisdiction where it may choose to do so.”249 Thus, even if a global license is rendered by a national court, a licensee may challenge its patents in other jurisdictions. But to what avail? As noted in Part I.B, once parties sign a global license, challenging patent validity in one country or another becomes far less rewarding except in the rare case that all of a party’s patents in a particular country are invalidated.250

The Court of Appeal went on to describe the practical difficulties that patent holders could face if national courts were not empowered to set global royalty rates:

On the assumption that only a country by country approach to licensing is FRAND, a patentee in the position of [Unwired Planet] would face not just the needless expense of negotiating and managing licenses on a country by country basis but also the problem of dealing with a potential licensee which is holding-out and refusing to engage in a reasonable way with the negotiation process. The patentee must then bring proceedings country by country to secure the payment of the royalties to which it is entitled. But unlike a normal patent action, where an unsuccessful defendant faces the prospect of an injunction, the reluctant licensee would know that, on the assumption it could only be required to take licences country by country, there would be no prospect of any effective injunctive relief being granted against it provided it agreed to pay the royalties in respect of its activities in any particular country once those activities had been found to infringe.251

Accordingly, the Court of Appeal in Unwired Planet II found that the burdens of a global license did not outweigh its practical benefits or make it inappropriate for a UK court to determine.252 In sum, the courts that have considered this issue appear to be comfortable with, or at least not opposed to, the prospect of a jurisdictional race to the bottom coupled with a litigant race to the courthouse.

D. The Finish Line?

In the context of multinational patent licensing, both the jurisdictional race to the bottom and the litigant race to the courthouse have already begun. As shown above, courts’ increasing willingness to compete in and facilitate these races, coupled with the liberalization in application of the anti-suit injunction,253 belie a trend that is not likely to reverse of its own accord. In the end, it may simply be that forum shopping and races to the bottom are inevitable consequences of unregulated multinational marketplaces in which global disputes are litigated in national forums.

Nevertheless, litigation and jurisdictional races are costly for markets and market participants. They distort the processes and motivations behind judicial and administrative rulemaking — substituting national desires to attract business for just and evenhanded application of the law. Moreover, they incentivize litigation “first strikes” when negotiation or compromise might be more appropriate and efficient. Accordingly, such races would ideally be eliminated in this increasingly important and internationalized commercial realm. As observed by one English practitioner, “The problem is only going to get more complex and more important … As well as moving into the next generation of telecom standards, the world is increasingly dealing with the connected world and the Internet of Things … involving a wide range of industries including telecoms, tech providers, automotive and broadcasting.”254

In response to this situation, several commentators, including the author, viewing litigation and judicial dispute resolution as inherently inefficient, costly and compromised,255 have proposed a range of private ordering solutions to resolve or forestall disputes involving standard-essential patents and FRAND licensing. These proposals have included mandatory “ex ante” rate disclosures,256 collective rate agreements,257 expedited bilateral arbitration,258 global rate-setting tribunals,259 patent pooling structures,260 and more.261

#### No link and turn: the plan only applies to Qualcomm because it’s the only monoculture, which opens up space for foreign 5G

<<Japan only has a small share, so there’s only a risk the plan opens the market up for them>>

<<protectionism’s high now, so motive to cooperative is strong>>

<<Japan doesn’t care because they have their own 5G>>

Nikkei Staff 20, (Nikkei Staff, 6-25-2020, "NTT to take 5% stake in NEC for Japanese 5G alliance," Nikkei Asia, https://asia.nikkei.com/Spotlight/5G-networks/NTT-to-take-5-stake-in-NEC-for-Japanese-5G-alliance)

TOKYO -- Japanese telecom conglomerate Nippon Telegraph & Telephone will take a 5% stake in electronics company NEC as part of a tie-up to develop fifth-generation wireless technology, Nikkei learned Wednesday. The deal, estimated at 60 billion yen ($562 million), will make NTT the third-largest shareholder in NEC. Shares in NEC rose 4.5% at one stage in morning trading in Tokyo on Thursday. The partnership aims to ensure Japan has its own homegrown 5G technology in light of the clash between the U.S. and China -- both leaders in this crucial field -- and with protectionism on the rise in the world more broadly. The two companies are expected to work on equipment for 5G core networks, which manage communication lines. NEC will also collaborate on next-generation 6G networks and NTT's proposed Innovative Optical and Wireless Network, or IOWN, high-speed broadband infrastructure. NTT aims to have network infrastructure in place by 2030 that can carry 100 times more data than at present. Globally, 5G networks are expected to become the foundation for innovations such as smart factories, self-driving vehicles and telemedicine. The market for core systems and base stations has largely been a three-way race among Huawei Technologies, Ericsson and Nokia, which together control 80% of the base station market. Japan, which launched commercial 5G service in March, relies on foreign players for the basic technology underlying its networks. Huawei has been active in the European market since the 4G era and has built strong relationships with the telecom companies. Out of the 91 5G commercial contracts Huawei had with global telecom companies as of February, roughly 50 were in Europe. Huawei's products are estimated to be 20% to 30% cheaper than competing products from Ericsson and Nokia.

The NTT-NEC tie-up aims to change that.

NEC also hopes to use the deal to accelerate its expansion overseas. The company boasts a high market share in Japan, with its equipment used in the 5G networks of carriers such as NTT Docomo and Rakuten, but it lags far behind the big three elsewhere. NEC recently announced an agreement with Rakuten, a newcomer to Japan's wireless scene, to jointly develop core network technology with an eye toward marketing 5G systems abroad. Though Huawei is a major player in the market for 5G gear such as base stations, distrust toward China has been growing in the U.S. and Europe, due partly to the coronavirus pandemic. Calls are mounting in London to block the company from the U.K.'s 5G networks, and the government has reportedly entered talks with NEC about providing equipment. NEC said in a statement on Thursday in response to Nikkei's report: "We are in talk with NTT about capital and business alliance, and plan to bring up the discussion in today's board of directors meeting." Masahiko Ishino, senior analyst at Tokai Tokyo Research Institute, said the market had "positive views on [businesses that look to] the new future." NTT's IOWN would lead to quick communication that consumed less energy than other networks, Ishino said.

#### Antitrust fervor is at an all-time high---thumps.

Zanfagna 9/7/21, \* [Gary Zanfagna](https://www.paulhastings.com/professionals/garyzanfagna) is an antitrust and competition partner at Paul Hastings LLP; (September 7th, 2021, “Antitrust isn't headed to an inflection point; it's already there”, https://thehill.com/opinion/judiciary/571087-antitrust-isnt-headed-to-an-inflection-point-its-already-there)

The truth is most companies have not had to think too much about antitrust regulations. The basic rules are pretty well known. But that is potentially changing quickly as antitrust concerns focus on not only high-tech companies, but businesses across the economy, from startups to global conglomerates.

It means antitrust is at an important inflection point. Changes are occurring at multiple levels — from [rule reform](https://www.klobuchar.senate.gov/public/_cache/files/e/1/e171ac94-edaf-42bc-95ba-85c985a89200/375AF2AEA4F2AF97FB96DBC6A2A839F9.sil21191.pdf) to [new applications](https://www.hawley.senate.gov/senator-hawley-introduces-trust-busting-twenty-first-century-act-plan-bust-anti-competitive-big) of existing rules to [increased enforcement](https://www.klobuchar.senate.gov/public/index.cfm/news-releases?ID=A4EF296B-9072-4244-90AF-54FE43BB0876). Some of these changes are a reflection of the economic upheaval ushered in by the digital economy, which has prompted businesses and governments to look to antitrust rules to solve their problems. Witness [President Biden](https://thehill.com/people/joe-biden)’s [July 9 executive order](https://www.whitehouse.gov/briefing-room/presidential-actions/2021/07/09/executive-order-on-promoting-competition-in-the-american-economy/) whose 72 provisions include requests ranging from asking the FCC to reinstate net neutrality rules to directing the FDA to issue rules to allow more competition in the hearing aid market.

It’s a reflection of a general zeitgeist whose goal is to slow the onslaught of consolidation in technology across industries, from news media to healthcare to agriculture. And it’s gathering momentum as new rules are being proposed from both sides of the aisle.

Many look to the 449-page [“Investigation of Competition in Digital Markets”](https://www.nytimes.com/interactive/2020/10/06/technology/house-antitrust-report-big-tech.html?action=click&module=RelatedLinks&pgtype=Article) report from the judiciary committee on antitrust as the opening salvo. The report took aim at Amazon, Apple, Facebook, and Google, outlining how those once scrappy startups now leverage their market position in ways not seen since “the era of oil barons and railroad tycoons.” The judiciary report’s conclusion: prevent big tech from acquiring smaller tech with tougher policing — and reform antitrust laws.

Both Democrats and Republicans have since voiced their support for such ideas.

Aimed at the seemingly intractable challenges of the digital era, Sen. [Amy Klobuchar](https://thehill.com/people/amy-klobuchar)’s (D-Minn.) “[Antitrust Law Enforcement Reform Act”](https://www.congress.gov/bill/117th-congress/senate-bill/225/text) would create barriers to prevent consolidation across industries, not just in tech, but in any business that might be connected to “dominant digital platforms.” The legislation would have a prescriptive force, creating a presumption against certain mergers, whether they be in biotech or burgers.

Meanwhile, on the Republican side, Sen. [Josh Hawley](https://thehill.com/people/joshua-josh-hawley) (R-Mo.) has rolled out a bill that looks even more severe, blocking some mergers and acquisitions outright. The [“Trust-Busting for the Twenty-First Century Act”](https://www.hawley.senate.gov/senator-hawley-introduces-trust-busting-twenty-first-century-act-plan-bust-anti-competitive-big) would ban any acquisitions by companies with a market cap of more than $100 billion. The act would also make it easier for the FTC to classify a company’s behavior as anti-competitive, and then extract penalties (including profits) based on that behavior.

And it’s not just the Federal government. Several states have proposed their own legislation to prevent and punish what they see as anti-competitive behavior. Arizona narrowly passed initial legislation that would prevent app store operators, specifically Apple and Google, from forcing developers to use their payment systems.

Meanwhile in New York State, the [Twenty-First Century Anti-Trust Act (S933)](https://www.nysenate.gov/legislation/bills/2019/s8700/amendment/a) includes a first-of-its-kind state merger notification of any deal in which the buyer would end up with more than $8 million in assets of the target. It would also create an “abuse of dominance” offense and give the N.Y. attorney general rulemaking authority — whether or not the company was based in New York.

These proposals have a long way to go before becoming law, but they demonstrate potentially significant antitrust adjustments coming.

Expanding antitrust view

The ripple effects will be profound, affecting transportation, communications, banking and healthcare companies. Incumbents looking to diversify their business are vulnerable, as are startups looking for profitable partners. Unhappy competitors who feel stymied may look to antitrust rules for remediation. And private equity moves to consolidate fledgling, fragmented industries will face tougher questions about overlap and industry concentration.

So, we are going to see antitrust being used in industries and in ways that haven’t been considered in many years, with views about market concentration expanding to encompass what used to be considered diverse or vertical markets. In fact, both Sen. Klobuchar’s and Sen. Hawley’s proposals specifically target consolidation across industries. Sen. Hawley’s $100 billion ban explicitly targets vertical acquisitions. It would certainly prevent deals like Facebook’s acquisition of WhatsApp or Google’s purchase of Fitbit.

## Cap

### 2AC---Cap K

#### Both advantages impact turn the K---they’re robust defenses of innovation, which the alt can’t solve.

Kornai 13, \*János Kornai is a Hungarian economist and the Allie S. Freed Professor of Economics Emeritus at Harvard and Professor Emeritus at Corvinus University of Budapest; (János, November 6th, 2013, “Dynamism, Rivalry, and the Surplus Economy”, DOI:10.1093/acprof:oso/9780199334766.001.0001, Google Books)

C. There is no competition between producers and sellers. Production is strongly concentrated. Many companies enjoy monopolist positions, or at least a (regional) monopoly in producing an entire group of products. The chronic shortage of products creates monopolistic behavior even when many producers operate in parallel. The shortage economy, one of the strongest system-specific properties of socialism, ~~paralyzes~~ impedes the forceful engine of innovation, the incentive to fight for the favors of the customer ( Kornai 1971 ; 1980; 1992, chapters 11 – 12 ). The producer/seller is not compelled to attract the buyer by offering him a new and better product, since the latter is happy to get anything in the shop, even an obsolete and poor-quality product.

There are examples of inventive activities motivated by chronic shortages: ingeniously created substitutes for missing materials or machinery parts (Laki 1984 –1985). These results of the inventors’ creative mind, however, do not become widespread, commercially successful innovations in the Schumpeterian sense. 25 Table 2.1 features only one revolutionary innovation that did not appear first in a capitalist country but, rather, in the Soviet Union: synthetic rubber. Its inventor had been doing research on the subject for decades; the employment of it in industry was rendered necessary by the shortage of natural rubber.

D. The tight limits of experimenting. Capitalism allows for hundreds or thousands of barren or barely fruitful attempts, so that, afterward, one out of the hundreds or thousands would succeed and bring immense success. In the socialist planned economy, actors are inclined to avoid risks. As a result, the application of revolutionarily significant innovations are more or less excluded, since those always mean a leap into the dark, as success is necessarily unpredictable. As far as followers are concerned, some economies follow up quickly, others slowly. The socialist economies belong to the group characterized by the slowest pace. They prefer to maintain the already known, old production procedures, and produce the old well-tried products; new technologies and new products have too many uncertain characteristics making the planning of the directives difficult.

E. There is no capital waiting to be utilized; investment allocation is rigid. Central planning is not miserly with the resources devoted to capital formation. The share of investment carved out from the total output is typically higher than in the capitalist economies. However, this enormous volume is appropriated ahead of time to the last penny. Moreover, most of the time over-allocation takes place; in other words, the ensemble of all project plans prescribes the requisition of more resources than the required amount to execute the plan. It never happens that unallocated capital is waiting for someone with a good idea. The allocators do not search for an entrepreneur waiting to step forward with a proposal for innovation. Flexible capital markets are unknown. Instead, the rigid and bureaucratic regulation of project activities takes place, and to devote capital resources to activities with possibly uncertain outcomes is unconceivable. No foolish minister of industry or factory manager could be found who would demand money for ventures admitting in advance that the money may be wasted and the innovation may not succeed. 26

#### Economic growth is responsible for drastic improvements in global living standards, and is the only path for future improvements.

Cowen 18, \*Tyler Cowen is a Holbert L. Harris Professor at George Mason University and Director of the Mercatus Center; (October 16th, 2018, “Stubborn Attachments: A vision for a society of free, prosperous, and responsible individuals”, <https://www.goodreads.com/en/book/show/31283667-stubborn-attachments>)

How good is growth, anyway ?

The history of economic growth indicates that, with some qualifications, growth alleviates misery, improves happiness and opportunity, and lengthens lives. Wealthier societies have better living standards, better medicines, and offer greater personal autonomy, greater fulfillment, and more sources of fun. While measured wealth does not exactly correspond to Wealth Plus, these two concepts have come pretty close to one another in the past, especially across the range of outcomes we have observed (as opposed to hypothetical thought experiments and counterfactuals).

We often forget how overwhelmingly positive the effects of economic growth have been. Economist Russ Roberts reports that he frequently polls journalists about how much economic growth there has been since the year 1900. According to Russ, the typical response is that the standard of living has gone up by around fifty percent. In reality, the U.S. standard of living has increased by a factor of five to seven, estimated conservatively, and possibly much more, depending on how we measure prices and the values of outputs over time, a highly inexact science.

The data show just how much living standards have gone up. In 1900, for instance, almost half of all U.S. households (forty-nine percent) had more than one occupant per room and almost one quarter (twenty-three percent) had over 3.5 persons per sleeping room. Slightly less than one quarter (twenty-four percent) of all U.S. households had running water, eighteen percent had refrigerators, and twelve percent had gas or electric lighting. Today, the figures for all of these stand at ninety-nine percent or higher. Back then, only five percent of households had telephones, and none of them had radio or TV. The high school graduation rate was only about six percent, and most jobs were physically arduous and had high rates of disability or even death. In the mid-nineteenth century, a typical worker might have put in somewhere between 2,800 and 3,300 hours of work a year; that estimate is now closer to 1,400 to 2,000 hours a year. 6

Until recently, polio, tuberculosis, and typhoid were common ailments, even among the rich. U.S. presidents George Washington, James Monroe, Andrew Jackson, Abraham Lincoln, Ulysses S. Grant, and James A. Garfield all caught malaria during their lives. Antibiotics and vaccines have existed for only a tiny fraction of human history, and it is no coincidence that they emerged in the wealthiest time period humanity has ever seen. There is also a strong and consistent relationship between wealth and rates of infant mortality; small children do best when they are born into wealthier countries, and that is because wealth supplies the resources to take better care of them.

As recently as the end of the nineteenth century, life expectancy in Western Europe was roughly forty years of age, and food took up fifty to seventy-five percent of a typical family budget. The typical diet in eighteenth-century France had about the same energy value as that of Rwanda in 1965, the most malnourished nation for that year. One effect of this deprivation was that most people simply did not have much energy for life.

In earlier time periods, most individuals performed hard physical labor, and a college or university education—or even a high school education—was a luxury. Leisure time has risen with economic growth. In 1880, about four-fifths of individuals’ discretionary time was spent working, according to economist Robert Fogel. Today we spend about fifty-nine percent of our time doing what we like, and that may rise to seventy-five percent by 2040. 8

The splendors of the modern world are not just frivolous baubles; they are important sources of human comfort and well-being. Imagine that a time traveler from the eighteenth century were to pay a visit to Bill Gates today. He would find televisions, automobiles, refrigerators, central heating, antibiotics, plentiful food, flush toilets, cell phones, personal computers, and affordable air travel, among other remarkable benefits. The most impressive features of Gates’s life, seen from the point of view of a person from the eighteenth century, are those shared by most citizens of wealthy countries today. My smartphone is as good as his. The very existence of an advanced civilization—the product of cumulative economic growth—confers immense benefits to ordinary citizens, including their ability to educate and entertain themselves and choose one life path over another. For further arguments along these lines, I recommend Steven Pinker’s recent book, Enlightenment Now: The Case for Reason, Science, Humanism, and Progress . 9

The economic growth of the wealthier countries benefits the very poor as well, though sometimes with considerable lags. The distribution of wealth changes over time, and not all growth trickles down, but as an overall historical average, the bottom quintile of an economy shares in growth. 10 You can see this by comparing the bottom quintile in, say, the United States to the bottom quintile in India or Mexico.

The richer economy can also do more to elevate the living standards of immigrants. Poor people who move to rich countries usually receive higher incomes and have better living conditions, and their children do better still. The richer the receiving country, the more new immigrants tend to benefit. Central American immigrants to the United States do better than Central American immigrants to Mexico or Nepalese immigrants to India. Immigrants also send remittances back home at a rate that far exceeds governmental foreign aid. Actual upward mobility in the United States far exceeds what the usual numbers indicate, because published statistics on upward mobility do not typically include a comparison with pre-immigration outcomes.

But the chain of benefits does not stop there. Migrants will often return to their home countries, bringing new skills and new business connections. Both India and Israel have developed vibrant technology and software scenes precisely because of their close ties with the start-up scene of the United States. English-language universities in English-speaking countries have trained many thousands of Asian students in science and engineering, again leading to new businesses and, eventually, higher economic growth in their home countries.

New medicines and technologies developed in wealthy nations also make their way to the rest of the world, as illustrated most conspicuously by the rapid spread of the cell phone and now the smartphone. One study predicts that if the leading twenty-one industrial countries were to boost their R&D by half a percentage point of GDP, U.S. output alone would grow by fifteen percent. But it doesn’t end there: output in Canada and Italy would grow by about twenty-five percent, and the output of all industrial nations would increase by 17.5 percent, on average. In the less economically developed countries, output would increase by about 10.6 percent on average. 11

Although these historical processes have often embodied unfairness and long lags of decades or more, economic growth has nonetheless brought wealth to the poor and elevated their status. The Greek city-states and the Roman Empire benefited from maritime trade across the Mediterranean; those regions in turn spread growth-enhancing institutions around Europe, Northern Africa, and the Middle East. The commercial revolution of the late Middle Ages and Renaissance reopened many of the trade routes of antiquity, and eventually human beings started to climb out of the Malthusian trap of very low per capita incomes at subsistence. The wealth of the West helped to enable the export miracles of the East Asian economies. Today, most poor countries seek greater access to wealthier Western and Asian markets, and flourish if they can achieve it. 12

For all the recent increases in inequality within individual nations, global inequality has declined over the last few decades, in large part because of growth in China and India. And the growth in these emerging nations was largely driven by earlier growth in the West and in East Asia. China, for instance, engaged in “catch-up” growth by adopting Western technologies and exporting to the wealthier nations. China has gone from being a quite poor nation to a “middle-income” nation with a sizable middle and upper class.

Although recent media coverage has focused almost exclusively on within-nation magnitudes, recent world history has been an extraordinarily egalitarian time. It is above all else a story about how global economic growth helps the poor. There has been a squeezing of the middle class in the wealthier nations, in part because of increasing global competition. Still, we have seen economic growth, aggregate wealth, and global income equality all rising together over the last twenty-five years. Many citizens in East Asia, South Asia, and Latin America have seen significant gains in their standard of living, and much of this has been a trickle-down effect from the earlier growth of the wealthier countries. Much of Africa is now following suit, bolstered in part by China’s demand for raw materials, and also by the spread of modern technologies such as affordable cell phones. 13

Sometimes extended periods of growth do not confer full or fair benefits to the poor or lower classes, for instance during the early phase of the British Industrial Revolution in the late eighteenth century. Still, the historical record suggests that it was better for Britain to push ahead with economic growth, as this eventually drove the greatest boost in living standards the world has ever seen. To be sure, there were probably better policies which, had they been adopted, would have distributed the benefits of growth more widely (e.g., fewer wars and Poor Law reform and free trade for the British). But even taking misguided policies into account, Britain fared better by pursuing economic growth rather than turning its back on the idea, even though significant real wage gains for the working class often did not arrive until the 1840s.

Nobel Laureate Amartya Sen has promoted the idea of “capabilities” as, if not quite a substitute for economic growth, then an alternative focus. Sen points out that our positive opportunities in life often matter more than the amount of cash in our bank accounts. He also notes that some parts of the world, such as the state of Kerala in India, have relatively good health and education indicators, even though their per capita incomes are relatively low.

Sen’s points are well taken, but they do not put a fundamental dent in the relevance of wealth, or, as I am calling it here, Wealth Plus. The significant benefits accrued from capabilities, such as health benefits, are accounted for in Wealth Plus, even if they are not properly represented in current GDP measures. In other words, Kerala is wealthier than some limited statistical measures imply. Wealth and good social outcomes are still strongly correlated on average, and this correlation is stronger over longer time horizons. For instance, if Kerala does not grow much in more narrow economic terms, it is unlikely to look so impressive in its social indicators fifty or one hundred years from now. Even today, Kerala manages as well as it does in large part because so many Keralans take jobs in wealthier countries, especially in the Gulf States, and send money back home. And compared to other Indian states, Kerala has an above-average measure of wealth, as well as above-average consumption expenditures, both of which are accounted for in traditional statistics. 14

The truth is that economic growth is the only permanent path out of squalor. Economic growth is how the Western world climbed out of the poverty of the year 1000 A.D. or 5000 B.C. It is how much of East Asia became remarkably prosperous. And it is how our living standards will improve in the future. Just as the present appears remarkable from the vantage point of the past, the future, at least provided growth continues, will offer comparable advances, including, perhaps, greater life expectancies, cures for debilitating diseases, and cognitive enhancements. Billions of people will have much better and longer lives. Many features of modern life might someday seem as backward as we now regard the large number of women in earlier centuries who died in childbirth for lack of proper care.

#### Technological innovation successfully dematerializes growth.

McAfee 19, \*Andrew Paul McAfee, a principal research scientist at MIT, is cofounder and codirector of the MIT Initiative on the Digital Economy at the MIT Sloan School of Management; (2019, “More from Less: The Surprising Story of How We Learned to Prosper Using Fewer Resources and What Happens Next”, https://b-ok.cc/book/5327561/8acdbe)

There is no shortage of examples of dematerialization. I chose the ones in this chapter because they illustrate a set of fundamental principles at the intersection of business, economics, innovation, and our impact on our planet. They are:

We do want more all the time, but not more resources. Alfred Marshall was right, but William Jevons was wrong. Our wants and desires keep growing, evidently without end, and therefore so do our economies. But our use of the earth’s resources does not. We do want more beverage options, but we don’t want to keep using more aluminum in drink cans. We want to communicate and compute and listen to music, but we don’t want an arsenal of gadgets; we’re happy with a single smartphone. As our population increases, we want more food, but we don’t have any desire to consume more fertilizer or use more land for crops.

Jevons was correct at the time he wrote that total British demand for coal was increasing even though steam engines were becoming much more efficient. He was right, in other words, that the price elasticity of demand for coal-supplied power was greater than one in the 1860s. But he was wrong to conclude that this would be permanent. Elasticities of demand can change over time for several reasons, the most fundamental of which is technological change. Coal provides a clear example of this. When fracking made natural gas much cheaper, total demand for coal in the United States went down even though its price decreased.

With the help of innovation and new technologies, economic growth in America and other rich countries—growth in all of the wants and needs that we spend money on—has become decoupled from resource consumption. This is a recent development and a profound one.

Materials cost money that companies locked in competition would rather not spend. The root of Jevons’s mistake is simple and boring: resources cost money. He realized this, of course. What he didn’t sufficiently realize was how strong the incentive is for a company in a contested market to reduce its spending on resources (or anything else) and so eke out a bit more profit. After all, a penny saved is a penny earned.

Monopolists can just pass costs on to their customers, but companies with a lot of competitors can’t. So American farmers who battle with each other (and increasingly with tough rivals in other countries) are eager to cut their spending on land, water, and fertilizer. Beer and soda companies want to minimize their aluminum purchases. Producers of magnets and high-tech gear run away from REE as soon as prices start to spike. In the United States, the 1980 Staggers Act removed government subsidies for freight-hauling railroads, forcing them into competition and cost cutting and making them all the more eager to not have expensive railcars sit idle. Again and again, we see that competition spurs dematerialization.

There are multiple paths to dematerialization. As profit-hungry companies seek to use fewer resources, they can go down four main paths. First, they can simply find ways to use less of a given material. This is what happened as beverage companies and the companies that supply them with cans teamed up to use less aluminum. It’s also the story with American farmers, who keep getting bigger harvests while using less land, water, and fertilizer. Magnet makers found ways to use fewer rare earth metals when it looked as if China might cut off their supply.

Second, it often becomes possible to substitute one resource for another. Total US coal consumption started to decrease after 2007 because fracking made natural gas more attractive to electricity generators. If nuclear power becomes more popular in the United States (a topic we’ll take up in chapter 15), we could use both less coal and less gas and generate our electricity from a small amount of material indeed. A kilogram of uranium-235 fuel contains approximately 2–3 million times as much energy as the same mass of coal or oil. According to one estimate, the total amount of energy that humans consume each year could be supplied by just seven thousand tons of uranium fuel.

Third, companies can use fewer molecules overall by making better use of the materials they already own. Improving CNW’s railcar utilization from 5 percent to 10 percent would mean that the company could cut its stock of these thirty-ton behemoths in half. Companies that own expensive physical assets tend to be fanatics about getting as much use as possible out of them, for clear and compelling financial reasons. For example, the world’s commercial airlines have improved their load factors—essentially the percentage of seats occupied on flights—from 56 percent in 1971 to more than 81 percent in 2018.

Finally, some materials get replaced by nothing at all. When a telephone, camcorder, and tape recorder are separate devices, three total microphones are needed. When they all collapse into a smartphone, only one microphone is necessary. That smartphone also uses no audiotapes, videotapes, compact discs, or camera film. The iPhone and its descendants are among the world champions of dematerialization. They use vastly less metal, plastic, glass, and silicon than did the devices they have replaced and don’t need media such as paper, discs, tape, or film.

If we use more renewable energy, we’ll be replacing coal, gas, oil, and uranium with photons from the sun (solar power) and the movement of air (wind power) and water (hydroelectric power) on the earth. All three of these types of power are also among dematerialization’s champions, since they use up essentially no resources once they’re up and running.

I call these four paths to dematerialization slim, swap, optimize, and evaporate. They’re not mutually exclusive. Companies can and do pursue all four at the same time, and all four are going on all the time in ways both obvious and subtle.

Innovation is hard to foresee. Neither the fracking revolution nor the world-changing impact of the iPhone’s introduction were well understood in advance. Both continued to be underestimated even after they occurred. The iPhone was introduced in June of 2007, with no shortage of fanfare from Apple and Steve Jobs. Yet several months later the cover of Forbes was still asking if anyone could catch Nokia.

Innovation is not steady and predictable like the orbit of the Moon or the accumulation of interest on a certificate of deposit. It’s instead inherently jumpy, uneven, and random. It’s also combinatorial, as Erik Brynjolfsson and I discussed in our book The Second Machine Age. Most new technologies and other innovations, we argued, are combinations or recombinations of preexisting elements.

The iPhone was “just” a cellular telephone plus a bunch of sensors plus a touch screen plus an operating system and population of programs, or apps. All these elements had been around for a while before 2007. It took the vision of Steve Jobs to see what they could become when combined. Fracking was the combination of multiple abilities: to “see” where hydrocarbons were to be found in rock formations deep underground; to pump down pressurized liquid to fracture the rock; to pump up the oil and gas once they were released by the fracturing; and so on. Again, none of these was new. Their effective combination was what changed the world’s energy situation.

Erik and I described the set of innovations and technologies available at any time as building blocks that ingenious people could combine and recombine into useful new configurations. These new configurations then serve as more blocks that later innovators can use. Combinatorial innovation is exciting because it’s unpredictable. It’s not easy to foresee when or where powerful new combinations are going to appear, or who’s going to come up with them. But as the number of both building blocks and innovators increases, we should have confidence that more breakthroughs such as fracking and smartphones are ahead. Innovation is highly decentralized and largely uncoordinated, occurring as the result of interactions among complex and interlocking social, technological, and economic systems. So it’s going to keep surprising us.

As the Second Machine Age progresses, dematerialization accelerates. Erik and I coined the phrase Second Machine Age to draw a contrast with the Industrial Era, which as we’ve seen transformed the planet by allowing us to overcome the limitations of muscle power. Our current time of great progress with all things related to computing is allowing us to overcome the limitations of our mental power and is transformative in a different way: it’s allowing us to reverse the Industrial Era’s bad habit of taking more and more from the earth every year.

### 2AC---Util

#### Weigh impacts using expected value, or magnitude times probability---it’s the only to ethically account for the underappreciated risk of high-magnitude threats.

Harris 17, \*John Harris is Politico’s editor-in-chief and author of The Survivor: Bill Clinton in the White House; \*Bryan Bender is Politico’s national security editor and author of You Are Not Forgotten. Both Harris and Bender covered the Pentagon during the tenure of Secretary of Defense William J. Perry; (January 6th, 2017, “Bill Perry Is Terrified. Why Aren’t You?”, https://www.politico.com/magazine/story/2017/01/william-perry-nuclear-weapons-proliferation-214604/)

And there’s one other difference from the Cold War: Americans no longer think about the threat every day.

Nuclear war isn’t the subtext of popular movies, or novels; disarmament has fallen far from the top of the policy priority list. The largest upcoming generation, the millennials, were raised in a time when the problem felt largely solved, and it’s easy for them to imagine it’s still quietly fading into history. The problem is, it’s no longer fading. “Today, the danger of some sort of a nuclear catastrophe is greater than it was during the Cold War,” Perry said in an interview in his Stanford office, “and most people are blissfully unaware of this danger.”

It is a turn of events that has an old man newly obsessed with a question: Why isn’t everyone as terrified as he is?

Perry’s hypothesis for the disconnect is that much of the population, especially that rising portion with no clear memories of the first Cold War, is suffering from a deficit of comprehension. Even a single nuclear explosion in a major city would represent an abrupt and possibly irreversible turn in modern life, upending the global economy, forcing every open society to suspend traditional liberties and remake itself into a security state. “The political, economic and social consequences are beyond what people understand,” Perry says. And yet many people place this scenario in roughly the same category as the meteor strike that supposedly wiped out the dinosaurs—frightening, to be sure, but something of an abstraction.

So Perry regards his last great contribution of a 65-year career as a crusade to stimulate the public imagination—to share the vivid details of his own nightmares. He is doing so in a recent memoir, in a busy public speaking schedule, in half-empty hearing rooms on Capitol Hill, and increasingly with an online presence aimed especially at young people. He has enlisted the help of his 28-year-old granddaughter to figure out how to engage a new generation, including [through a series of virtual lectures](https://lagunita.stanford.edu/courses/course-v1:Engineering+NuclearBrink+Fall2016/about) known as a MOOC, or massive open online course. He is eagerly signing up for “Ask Me Anything” chats on Reddit, in which some people still confuse him with William “The Refrigerator” Perry of NFL fame. He posts his ruminations on YouTube, where they give Katy Perry no run for her money, even as the most popular are closing in on 100,000 views. One of the nightmare scenarios Perry invokes most often is designed to roust policymakers who live and work in the nation’s capital. The terrorists would need enriched uranium. Due to the elaborate and highly industrial nature of production, hard to conceal from surveillance, fissile material is still hard to come by—but, alas, far from impossible. Once it is procured, with help from conspirators in a poorly secured overseas commercial power centrifuge facility, the rest of the plot as Perry imagines it is no great technological or logistical feat. The mechanics of building a crude nuclear device are easily within the reach of well-educated and well-funded militants. The crate would arrive at Dulles International Airport, disguised as agricultural freight. The truck bomb that detonates on Pennsylvania Avenue between the White House and Capitol instantly kills the president, vice president, House speaker, and 80,000 others. Where exactly is your office? Your house? And then, as Perry spins it forward, how credible would you find the warnings, soon delivered to news networks, that five more bombs are set to explode in unnamed U.S. cities, once a week for the next month, unless all U.S. military personnel overseas are withdrawn immediately? If this particular scenario does not resonate with you, Perry can easily rattle off a long roster of others—a regional war that escalates into a nuclear exchange, a miscalculation between Moscow and Washington, a computer glitch at the exact wrong moment. They are all ilks of the same theme—the dimly understood threat that the science of the 20th century is set to collide with the destructive passions of the 21st. “We’re going back to the kind of dangers we had during the Cold War,” Perry said. “I really thought in 1990, 1991, 1992, that we left those behind us. We’re starting to re-invent them. We and the Russians and others don’t understand that what we’re doing is re-creating those dangers—or maybe they don’t remember the dangers. For younger people, they didn’t live through those dangers. But when you live through a Cuban Missile Crisis up close and you live through a false alarm up close, you do understand how dangerous it is, and you believe you should do everything you could possibly do to [avoid] going back.” For people who follow the national security priesthood, the dire scenarios are all the more alarming for who is delivering them. Through his long years in government Perry invariably impressed colleagues as the calmest person in the room, relentlessly rational, such that people who did not know him well—his love of music and literature and travel—regarded his as a purely analytical mind, emotion subordinated to logic and duty. Starting in the 1950s as a technology executive and entrepreneur in some of the most secretive precincts of the defense industry, he gradually took on a series of high-level government assignments that gave him one of the most quietly influential careers of the Cold War and its aftermath. Fifteen years before serving as Bill Clinton’s secretary of defense, Perry was the Pentagon official in charge of weapons research during the Carter administration. It was from this perch that he may have had his most far-reaching impact, and left him in some circles as a legendary figure. He used his office to give an essential push to two ideas that transformed warfare over the next generation decisively to American advantage. One idea was stealth technology, which allowed U.S. warplanes to fly over enemy territory undetected. The other was precision-guided munitions, which allowed U.S. bombs to land with near-perfect accuracy. During the Clinton years, Perry so prized his privacy that he initially turned down the job of Defense secretary—changing his mind only after Clinton and Al Gore pleaded with him that the news media scrutiny wouldn’t be so bad. The reputation he built over a life in the public sphere is starkly at odds with this latest highly impassioned chapter of Perry’s career. Harold Brown, who also is 89, first recruited Perry into government, and was Perry’s boss while serving as Defense secretary in the Carter years. “No one would have thought of Bill Perry as a crusader,” he says. “But he is on a crusade.” Lee Perry, his wife of nearly 70 years, is living in an elder care facility, her once buoyant presence now lost to dementia. Perry himself, lucid as ever, has seen his physical frame become frail and stooped. Rather than slowing his schedule, he has accelerated his travels to plead with people to awaken to the danger. A trip to Washington includes a dinner with national security reporters and testimony on Capitol Hill. Back home in California, he’s at the Google campus to prod engineers to contemplate that their world may not last long enough for their dreams of technology riches to come true. He’s created an advocacy group, [the William J. Perry project](http://www.wjperryproject.org/), devoted to public education about nuclear weapons. He’s enlisted both his granddaughter and his 64-year-old daughter, Robin Perry, in the cause. But if his profile is rising, his style is essentially unchanged. He is a man known for self-effacement, trying to shape an era known for relentless self-promotion, a voice of quiet precision in a time of devil-take-the-hindmost bombast. The rational approach to problem-solving that propelled his career and won him adherents and friends in both political parties and even among some of America’s erstwhile enemies remains his guide—in this case, by endeavoring to calculate the possibilities and probabilities of a terrorist attack, regional nuclear war, or horrible miscalculation with Russia. “I want to be very clear,” he said. “I do not think it is a probability this year or next year or anytime in the foreseeable future. But the consequence is so great, we have to take it seriously. And there are things to greatly lower those possibilities that we’re simply not doing.” \*\*\* Perry really did not expect he would have to write this chapter of his public life. His official career closed with what seemed then an unambiguous sense of mission accomplished. By the time he arrived in the Pentagon’s top job in 1994, the Cold War was over, and the main item on the nuclear agenda seemed to be cleaning up no-longer-needed arsenals. As defense secretary, Perry stood with his Russian counterpart, Pavel Grachev, as they jointly blew up missile silos in the former Soviet Union and tilled sunflower seeds in the dirt. “I finally thought by the end of the ‘80s we lived through this horrible experience and it’s behind us,” Perry said. “When I was secretary, I fully believed it was behind us.” After leaving the Pentagon, he accepted an assignment from Clinton to negotiate an end to North Korea’s nuclear development program—and seemed agonizingly close to a breakthrough as the last days of the president’s term expired. Now, he sees his grandchildren inheriting a planet possibly more dangerous than it was during his public career. No one could doubt that the Sept. 11 terrorists would have gladly used nuclear bombs instead of airplanes if they had had them, and it seems only a matter of time until they try. Instead of a retreating threat in North Korea, that fanatical regime now possesses as many as eight nuclear bombs, and is just one member of a growing nuclear club. Far from a new partnership with Russia, Vladimir Putin has given old antagonisms a malevolent new face. American policymakers talk of spending up to $1 trillion to modernize the nuclear arsenal. And now comes Donald Trump with a long trail of statements effectively shrugging his shoulders about a world newly bristling with bombs and people with reasons to use them. Perry knew Hillary Clinton well professionally, and says he admired both her and Bill Clinton for their professional judgment though he was never a personal intimate of either. He was prescient before the election in expressing skepticism about how voters would respond to the dynastic premise of the Clinton campaign—a healthy democracy should grow new voices—but was as surprised as everyone else on Election Day. Donald Trump was not the voice he was looking for, to put it mildly, but he has responded to the Trump cyclone with modulated restraint. Perry said he assumes his most truculent rhetoric isn’t serious, the utterances of a man who assumed his words were for political effect only and had no real consequences. Now that they do, Perry is hoping to serve as a kind of ambassador to rationality. He said he is hoping for audiences soon, with Trump if the incoming president will see him, and certainly Trump’s national security team, which includes several people Perry knows, including Defense Secretary nominee James Mattis. There is little doubt the message if the meeting comes. “We are starting a new Cold War,” he says. “We seem to be sleepwalking into this new nuclear arms race. … We and the Russians and others don’t understand what we are doing.” “I am not suggesting that this Cold War and this arms race is identical to the old one,” Perry added. “But in many ways, it is just as bad, just as dangerous. And totally unnecessary.” \*\*\* Perry had been brooding over the question for a year. It was in the early 1950s, he was still in his 20s, and the subject was partial differential equations—the topic of his Ph.D. thesis. A particular problem had been absorbing him, day in and day out, hours and hours on end. Then, out of nowhere, a light came on. Math for Perry represented analytical discipline, a way of achieving mastery not only over numerical problems but any hard problem, by breaking it down into essential parts, distilling complexity into simplicity. | Photo via the William J. Perry Project “I woke up in the middle of the night, and it was all there,” Perry recalled. “It was all there, and I got out of bed and sat down. The next two or three hours, I wrote my thesis, and from the first word I wrote down, I never doubted what the last word was going to be: It was a magic moment.” The story is a reminder of something definitional about Bill Perry. Before he became in recent years an apostle of disarmament, before he sat atop the nation’s war-making apparatus in the 1990s, before he was the executive of a defense contractor specializing in the most complex arenas of Cold War surveillance in the 1960s, he was a young man in love with mathematics. In those days, Perry had planned on a career as a math professor. His attraction to math was not merely practical, in the way that engineers or architects rely on math. The appeal was just as much aesthetic, in ways that people who are not numbers people—political life tends to be dominated by word people—cannot easily comprehend. To Perry’s mind, there was a purity to math, a beauty to the patterns and relationships, that was not unlike music. Math for Perry represented analytical discipline, a way of achieving mastery not only over numerical problems but any hard problem, by breaking it down into essential parts, distilling complexity into simplicity. This trait was why Pentagon reporters in the 1990s liked spending time around Perry. When most public officials are asked a question, one studies the transcript later to decipher a succession of starts and stalls, sentence fragments and ellipses, that cumulatively convey an impressionistic sense of mind but no clear fixed meaning. Perry’s sentences, by contrast, always cut with surgical precision. It was one reason Clinton White House officials often held their breath when he gave interviews—Perry might make news by being clear on subjects, such as ethnic warfare in the Balkans or a nuclear showdown in North Korea, that the West Wing preferred to try to fog over.

“I’ve never been able to attack a policy problem with a mathematical formula,” he recalled, “but I have always believed that the rigorous way of thinking about a problem was good. It separated the fact from the bullshit, and that’s very important sometimes, to separate what you can from what you would hope you can do.”

Just how high is the risk? The answer is ultimately unknowable. Perry’s point, though, is that it’s a hell of a lot higher than you think. | M. Scott Mahaskey/POLITICO

Perry wishes more people were familiar with the concept of “expected value.” That is a statistical way of understanding events of very large magnitude that have a low probability. The large magnitude event could be something good, like winning a lottery ticket. Or it could be something bad, like a nuclear bomb exploding. Because the odds of winning the lottery are so low, the rational thing is to save your money and not buy the ticket. As for a nuclear explosion, by Perry’s lights, the consequences are so grave that the rational thing would be for people in the United States and everywhere to be in a state of peak alarm about their vulnerability, and for political debate to be dominated by discussion of how to reduce the risk.

And just how high is the risk? The answer of course is ultimately unknowable. Perry’s point, though, is that it’s a hell of a lot higher than you think.

Perry invites his listeners to consider all the various scenarios that might lead to a nuclear event. “Mathematically speaking, you add those all together in one year it is still just a possibility, not a probability,” he reckons. “But then you go out ten, twenty years and each time this possibility repeats itself, and then it starts to become a probability. How much time we have to get those possibility numbers lower, I don’t know. But sooner or later the odds are going to get us, I am afraid.”

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Almost uniquely among living Americans, Bill Perry has actually faced down the prospect of nuclear war before—twice. In the fall of 1962, Bill Perry was 35, father of five young children, living in the Bay Area and serving as director of Sylvania’s Electronic Defense Laboratories—driving his station wagon to recitals in between studying missile trajectories and the radius of nuclear detonations. Where he resided was not then called Silicon Valley, but the exuberance and spirit of creative possibility we now associate with the region was already evident. The giants then were Bill Hewlett and David Packard, men Perry deeply admired and wished to emulate in his own business career. The innovation engine at that time, however, was not consumer technology; it was the government’s appetite for advantage in a mortal struggle against a powerful Soviet foe. Perry was known as a star in the highly complex field of weapons surveillance and interpretation. So it was not a surprise, one bright October day, for Perry to get a call from Albert “Bud” Wheelon, a friend at the Central Intelligence Agency. Wheelon said he wanted Perry in Washington for a consultation. Perry said he’d juggle his schedule and be there the next week. “No,” Wheelon responded. “I need to see you right away.” Perry caught the red-eye from San Francisco, and went straight to the CIA, where he was handed photographs whose meaning was instantly clear to him. They were of Soviet missiles stationed in Cuba. For the next couple weeks, Perry would stay up past midnight each evening poring over the latest reconnaissance photos and help write the analysis that senior officials would present the next morning to President Kennedy. Perry experienced the crisis partly as ordinary citizen, hearing Kennedy on television draw an unambiguous line against Soviet missiles in this hemisphere and promising that any attack would be met with “a full retaliatory response.” But he possessed context, about the capabilities of weapons and the daily state of play in the crisis, that gave him a vantage point superior to that of all but perhaps a few dozen people. “I was part of a small team—six or eight people,” he recounted of those days 54 years earlier. “Half of them technical experts, half of them intelligence analysts, or photo interpreters. It was a minor role but I was seeing all the information coming in. I thought every day when I went back to the hotel it was the last day of my life because I knew exactly what nuclear weapons could do. I knew it was not just a lot of people getting killed. It was the end of civilization and I thought it was about to happen.” Left: A January 1963 aerial photo showing that the Soviets had disbanded medium- and intermediate-range ballistic missile sites in Cuba. Right: Soviet freighter Polzunov (top) loaded with nuclear missiles removed from Cuba, is escorted by American destroyer Vesole outside Cuban waters on trek back to Russia near end of Cuban Missile Crisis. | Defense Department; Carl Mydans/The LIFE Picture Collection/Getty Images It was years later that Perry, like other more senior participants in the crisis, learned how right that appraisal was. Nuclear bombs weren’t only heading toward Cuba on Soviet ships, as Kennedy believed and announced to Americans at the time. Some of them were already there, and local commanders had been given authority to use them if Americans launched a preemptive raid on Cuba, as Kennedy was being urged, goaded even, by Air Force Gen. Curtis LeMay and other military commanders. At the same time, Soviet submarines were armed and one commander had been on the verge of launching them until other officers on the vessel talked him out of it. Either event would have in turn sent U.S. missiles flying. The Cuban Missile Crisis recounting is one of the dramatic peaks in “My Journey on the Nuclear Brink,” the memoir Perry published last fall. It is a book laced with other close calls—like November 9, 1979, when Perry was awakened in the middle of the night by a watch officer at the North American Aerospace and Defense Command (NORAD) reporting that his computers showed 200 Soviet missiles in flight toward the United States. For a frozen moment, Perry thought: This is it—This is how it ends. The watch officer soon set him at ease. It was a computer error, and he was calling to see whether Perry, the technology expert, had any explanation. It took a couple days to discover the low-tech answer: Someone had carelessly left a crisis-simulation training tape in the computer. All was well. But what if this blunder had happened in the middle of a real crisis, with leaders in Washington and Moscow already on high alert? The inescapable conclusion was the same as it was in 1962: The world skirting nuclear Armageddon as much by good luck as by skilled crisis management. Perry is part of a distinct cohort in American history, one that didn’t come home with the large-living ethos of the World War II generation, but took responsibility for cleaning up the world that the war bequeathed. He was a 14-year-old in Butler, Pennsylvania when he heard the news of the Pearl Harbor attack in a friend’s living room, and had the disappointed realization that the war might be over by the time he was old enough to fight in it. That turned out to be true—he was just shy of 18 at war’s end—a fact that places Perry in what demographers have called the “Silent Generation,” too young for one war but already middle-aged by the time college campuses erupted over Vietnam. Like many in his generation, Perry was not so much silent as deeply dutiful, with an understated style that served as a genial, dry-witted exterior to a life in which success was defined by how faithfully one met his responsibilities. Perry said he became aware, first gradually and over time profoundly, of the surreal contradictions of his professional life. His work—first at Sylvania and then at ESL, a highly successful defense contracting firm he co-founded in 1963—was relentlessly logical, analyzing Soviet threats and intentions and coming up with rational responses to deter them. But each rational move was part of a supremely irrational dynamic—“mutually assured destruction”—that placed the threat of massive casualties at the heart of America’s basic strategic thinking. It was the kind of framework in which policymakers could accept that a mere 25 million people dead was good news. Also the kind that in one year alone led the United States to produce 8,000 nuclear bombs. By the end, the Cold War left the planet with about 70,000 bombs ([a total that](https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat) is now down to about 15,500). “I think probably everybody who was involved in nuclear weapons in those days would see the two sides of it,” Perry recalls, “the logic of deterrence and the madness of deterrence, and there was no mistake, I think, that the acronym was MAD.” \*\*\* Perry has been at the forefront of a movement that he considers the sane and only alternative, and he has joined forces with other leading Cold Warriors who in another era would likely have derided their vision as naïve. In January 2007, he was a co-author of a remarkable commentary that ran on the op-ed page of the Wall Street Journal. It was signed also by two former secretaries of state, George Schulz and Henry Kissinger and by Sam Nunn, a former chairman of the Senate Armed Services Committee—all leading military hawks and foreign policy realists who came together to argue for something radical: that the goal of U.S. policy should be not merely the reduction and control of atomic arms, it should be the ultimate elimination of all nuclear weapons. This sounded like gauzy utopianism, especially bizarre coming from supremely pragmatic men. But Perry and the others always made clear they were describing a long-term ideal, one that would only be achieved through a series of more incremental steps. The vision was stirring enough that it was endorsed by President Obama in his opening weeks in office, in a March 2009 address in Prague. In retrospect, Obama’s speech may have been the high point for the vision of abolition. “A huge amount of progress was made,” recalled Shultz, now 93. “Now it is going in the other direction.” “We have less danger of an all-out war with Russia,” in Nunn’s view. “But we have more danger of some type of accident, miscalculation, cyber interference, a terrorist group getting a nuclear weapon. It requires a lot more attention than world leaders are giving it.” Perry’s goal now is much more defensive than it was just a few years ago—halting what has become inexorable momentum toward reviving Cold War assumptions about the central role of nukes in national security. More recently he’s added yet another recruit to his cause: California Governor Jerry Brown. Brown, now 78, met Perry a year ago, after deciding that he wanted to devote his remaining time in public service mainly to what he sees as civilization’s two existential issues, climate change and nuclear weapons. Brown said he became fixated on spreading Perry’s message after reading his memoir: He recently gave a copy to President Obama and is trying to bend the ear of others with influence in Washington. If Bill Perry has a gift for understatement, Brown has a gift for the theatrical. In an interview at the governor’s mansion in Sacramento, he wonders why everyone is not paying attention to his new friend and his warnings for mankind. “He is at the brink! At the brink! Not WAS at the brink—IS at the brink,” Brown exclaimed. “But no one else is.” A California governor can have more influence, at least indirectly, than one might think, due to the state’s outsized role in policy debates and the fact that the University of California’s Board of Regents helps manage some of the nation’s top weapons laboratories, which study and design nuclear weapons. Brown, who was a vocal critic in the 1980s of what he called America's "nuclear addiction," reviewed Perry's recent memoir in the New York Review of Books, and said he is determined to help his new friend spread his message. “Everybody is, 'we are not at the brink,' and we have this guy Perry who says we are. It is the thesis that is being ignored." Even if more influential people wake up to Perry’s message—a nuclear event is more likely and will be more terrible than you realize—a hard questions remains: Now what? This is where Perry’s pragmatism comes back into play. The smartest move, he thinks, is to eliminate the riskiest part of the system. If we can’t eliminate all nukes, Perry argues, we could at least eliminate one leg of the so-called nuclear triad, intercontinental ballistic missiles. These are especially prone to an accidental nuclear war, if they are launched by accident or due to miscalculation by a leader operating with only minutes to spare. Nuclear weapons carried by submarines beneath the sea or aboard bomber planes, he argues, are logically more than enough to deter Russia.

The problem, he knows, is that logic is not necessarily the prevailing force in political debates. Psychology is, and this seems to be dictating not merely that we deter a Russian military force that is modernizing its weapons but that we have a force that is self-evidently superior to them.

It is an argument that strikes Perry as drearily familiar to the old days. Which leads him the conclusion that the only long-term way out is to persuade a younger generation to make a different choice.

His granddaughter, Lisa Perry, is precisely in the cohort he needs to reach. At first she had some uncomfortable news for her grandfather: Not many in her generation thought much about the issue.

“The more I learned from him about nuclear weapons the more concerned I was that my generation had this massive and dangerous blind spot in our understanding of the world,” she said in an interview. “Nuclear weapons are the biggest public health issue I can think of.”

But she has not lost hope that their efforts can make a difference, and today she has put her graduate studies in public health on hold to work full time for the Perry Project as its social media and web manager. “It can be easy to get discouraged about being able to do anything to change our course,” she said. “But the good news is that nuclear weapons are actually something that we as humans can control...but first we need to start the conversation.”

It was with her help that Perry went on Reddit to [field questions](https://www.reddit.com/r/IAmA/comments/4a0ga4/iam_william_j_perry_former_secretary_of_defense/) ranging from how his PhD in mathematics prepared him to what young people need to understand.

“As a 90s baby I never lived in the Cold War era,” wrote one participant, with the Reddit username BobinForApples. “What is one thing today's generations will never understand about life during the Cold War?”

Perry answered, as SecDef19: “Because you were born in the 1990s, you did not experience the daily terror of ‘duck and cover’ drills as my children did. Therefore the appropriate fear of nuclear weapons is not part of your heritage, but the danger is just as real now as it was then. It will be up to your generation to develop the policies to deal with the deadly nuclear legacy that is still very much with us.”

For the former defense secretary, the task now is to finally—belatedly—prove Einstein wrong. The physicist said in 1946: “The unleashed power of the atom has changed everything save our modes of thinking and we thus drift toward unparalleled catastrophe.”

In Perry’s view the only way to avoid it is by directly contemplating catastrophe—and doing so face to face with the world’s largest nuclear power, Russia, as he recently did in a forum in Luxembourg with several like-minded Russians he says are brave enough to speak out about nuclear dangers in the era of Putin.

#### Default to consequentialism

Sikkink 8, Professor of political science at the University of Minnesota (Kathryn Sikkink, 2008, “The Role of Consequences, Comparison, and Counterfactuals in Constructivist Ethical Thought,” <http://www.polisci.umn.edu/centers/theory/pdf/sikkink.pdf)>

Ethical arguments of these different types are ubiquitous and necessary. But because they are also slippery and open to manipulation and misuse, we also need to be very careful and precise about how we go about using them. I would recommend that first we distinguish very carefully between the comparison to ideals and historical empirical comparison. I believe that many critical constructivist accounts rely on the comparison to the ideal or to the conditions of possibility counterfactual argument. In almost every critical constructivist work there is an implicit ideal ethical argument. This argument is implicit because it is rarely clearly stated, but it is found in the nature of the 36 critique. So, for example, in her discussion of U.S. human rights policy, Roxanne Doty critiques a human rights policy carried out by actors who sometimes use it for their own self aggrandizement and to denigrate others. 42 The implicit ideal this presents is a human rights policy that is not used for denigration or surveillance or othering those it criticizes or conversely, of elevating those who advocate it. What would be examples of such a policy? The book does not provide examples. We do not know if examples exist in the world. So the implicit comparison is a comparison to an ideal – a never fully stated ideal, but one present in the critique of what is wrong with the policies discussed. Nicolas Guilhot makes a similar argument in his recent book. The promotion of democracy and human rights, he argues, are increasingly used in order to extend the power they were meant to limit. “The promotion of democracy and human rights defines new forms of administration on a global scale and generates a new political science.” He historically examines how progressive movements for democracy and human rights have become hegemonic because they “systematically managed to integrate emancipatory and progressive forces in the construction of imperial policies.” But once again, the book offers no alternative political scenario. In the final sentence of the book, the author clarifies that “this book has no other ambition than to contribute to the democratic critique of democracy.” 43 In the introduction, he clarifies, “This book does not provide answers to these dilemmas. At most, its only ambition is to highlight them, in the hope that a proper understanding constitutes a first step toward the invention of new courses of action.”44 Ethically, I believe this is a cop-out. Politically and intellectually, I find it too comfortable and too easy. This critique has a crucial role to play in pointing to hypocrisy (as Price highlights in the introduction). It could also serve as a catalyst for policy change in the direction of policy that would include less surveillance or less cooptation of human rights discourse. But it is unlikely to serve as a catalyst for new action or policy change unless it ventures something more than pure critique, unless it risks a political or ethical proposal. Without that, it has the impact of delegitimizing any human rights policy without suggesting any alternative. Any policy to promote human rights of democracy policy is shown to be deeply flawed or even pernicious. It is portrayed as part of the problem, certainly not as offering any kind of solution. Human rights policy appears to make the situation worse, not better. The critique has the effect of telling us clearly what we do not want, what we can not support—human rights policies by imperfect and hypocritical actors like the U.S. In its historical comparisons, it also lumps human rights policy together with colonialism and does not provide any elements to distinguish between one policy of surveillance and other. All are equally flawed. The ethical effect is to remove normative support from existing policies without producing any alternatives. This is similar to what Price means when he says that “critical accounts which do not in fact offer constructive normative theorizing to follow critique ironically lend themselves to being complicit with the conservative agenda opposing erstwhile progressive change in world politics.” Neither Doty nor Guilhot, for example, contrast two human rights policies to give examples of policies that are more of less hypocritical or where there has been more or 44 Guilhot, p. 14. 38 less surveillance. They don’t contrast human rights policies or democracy promotion policies to previous policies that were also hypocritical and self aggrandizing, but more pernicious – e.g. national security ideology and support for authoritarian regimes in the third world. By presenting no contrasts, the critique would appear to say that there is no ethical or political difference between a policy that supports coups and funds repressive military regimes and a policy that critiques coups and cuts military aid to repressive regimes.

These policies would appear to be ethically indistinguishable. Indeed, by these standards, a realist policy (a la Kissinger) might be preferable. Kissinger didn’t denigrate his authoritarianism allies. He took regimes as they were. He treated them as valuable allies. He didn’t lecture them on how they should change. He also, in doing so, encouraged, in some cases, coups and mass murder. But at least he didn’t “Other”. Doty and Guilhot give me no ethical criteria to distinguish between the policies of the Kissinger administration, the Carter administration, and current Bush administration policy. Because the comparison is an implicit ideal, never an empirical real world example, the critique is very telling and can delegitimize the critiqued policy. But nothing is put in its place. So, it demobilizes any support we might have for any human rights policy. It puts the analyst in an ethically comfortable position, but by not proposing any explicit comparison, it demobilizes the reader. We learn what to oppose, to critique, but we don’t learn explicitly what to support in its stead. The result can be political paralysis. One finds it difficult to act.

# 1AR

## Advantage 1

### 1AR---!---Democracy

#### The absolute best and newest studies verify the link between democracies and peace.

Kosuke Imai 20, PhD in Political Science @ Harvard, Professor in the Department of Government and the Department of Statistics at Harvard University, “Robustness of Empirical Evidence for the Democratic Peace: A Nonparametric Sensitivity Analysis”, https://imai.fas.harvard.edu/research/files/dempeace.pdf

The democratic peace — the idea that democracies rarely fight one another — has been called “the closest thing we have to an empirical law in the study of international relations.” Yet, some contend that this relationship is spurious and suggest alternative explanations. Unfortunately, in the absence of randomized experiments, we can never rule out the possible existence of such confounding biases. Rather than commonly used regression-based approaches, we apply a nonparametric sensitivity analysis. We show that overturning the positive association between democracy and peace would require a confounder that is 47 times more prevalent in democratic dyads than in other dyads. To put this number in context, the relationship between democracy and peace is at least five times as robust as that between smoking and lung cancer. To explain away the democratic peace, therefore, scholars must find far more powerful confounders than already those identified in the literature.

## T

### 1AR---W/M

#### We meet---FTC v Qualcomm exempted SSOs from antitrust liability---we remove that. The reason it’s not in the 1NC list is because that is from 2014, which was years before FTC v Qualcomm!!!

#### Thanks.

Christopher L. Sagers ‘15, James A. Thomas Distinguished Professor of Law and Faculty Director of the Cleveland-Marshall Solo Practice Incubator, CSU Cleveland-Marshall Law, Editorial Chair, Handbook on the Scope of Antitrust, ABA SECTION OF ANTITRUST LAW, HANDBOOK ON THE SCOPE OF ANTITRUST (2015), poapst

On the other hand, scope limits of various kinds have always existed. Congress explicitly limited antitrust by statute as early as 1914,19 and did so many more times during the rise of organized labor20 and the price-and-entry regulatory regimes of the Progressive and New Deal eras.21 Judge-made limits were likewise recognized as early as 1922, again mainly as a consequence of the new regulatory regimes.22 As new waves of health and safety regulation emerged during the 1960s and 1970s,23 defendants sought antitrust clemency with some increasing success.24 Courts have also long sought to protect the political process from antitrust, even though businesses have frequently turned to that arena for advantage within the marketplace.25 Interestingly, most other nations with competition laws have similar histories of complex scope limits. The European Union (EU), for example, built a process for exemption into the very first treaty creating its competition law,26 and much of the work of its competition authority has involved administration of that process. The national laws of several EU member states likewise included various exclusions before creation of the EU,27 and exemptions exist in Australia, Canada, Japan, and South Korea.28 This long history, in which the generally broad applicability of the antitrust laws has been fraught with controversial disputes, can be seen as a struggle between the general and the specific. For the most part, substantive antitrust insists on generality and purports to oppose special treatment for the idiosyncrasies of particular markets.29 Antitrust presumes, in other words, that in respects important to antitrust, markets are mostly the same. Thus, in the absence of an **exemption**, the U.S. antitrust laws apply to all exchanges of goods or services for consideration, anywhere within the domestic reach of Congress’s interstate commerce power, and quite broadly to overseas conduct as well, where anticompetitive effects are felt in the United States.30 Yet, that broad application, especially during periods in which antitrust laws were applied more strictly and many kinds of conduct were held per se illegal, invites arguments that some contexts simply cannot be subject to one-size-fits-all policies.31 There have been times, as during the heyday of “destructive competition” reasoning during the first part of the 20th century, when industries like transportation, communications, and insurance were quite successful in arguing that special economic problems prevented them from performing well under the rules of competition that antitrust imposed elsewhere.32 Similar arguments have found some traction in more recent times, even as during this purportedly deregulatory age we generally claim to have disposed of the long-standing fear of destructive competition. For example, recent, **explicit antitrust exemptions** now protect standard setting organizations,33 the placement program for medical residents,34 and charitable gift annuities. Accordingly, despite the strong commitment to generality often stated, **we do in fact see limits on scope**. For the most part, the courts and Congress have followed one consistent instinct in moderating these struggles between the general and the specific. They typically will relax the preference for antitrust only where there is some other public, politically accountable oversight of a particular market. In effect, **antitrust exemptions** usually reflect the instinct that we should have **either regulation** **or** **antitrust** in any given context, which is to say that any context should be regulated either by direct government oversight or by competition kept healthy through antitrust.36 Thus, at least traditionally, Congress rarely displaced antitrust without setting up an administrative agency to take its place. Likewise, where courts fashioned scope limitations, they generally did so only where a regulatory agency oversaw rates or conduct (as with the filed rate doctrine) or where the challenged conduct was actually the conduct of a government entity itself (as with the state action doctrine).

## K

### 1AR---AT: Alt---T/L

#### The military devastates it.

DeBoer 16, Academic Assessment Manager for Brooklyn College in the City University of New York, Limited-Term Lecturer, Introductory Composition at Purdue Program (Fredrik DeBoer, 3-15-2016, “c’mon, ~~guys~~,” http://fredrikdeboer.com/2016/03/15/cmon-guys/)

I could be wrong about the short-term dangers, and the stakes are incredibly high. But in the end we’re left with the same old question: what tactics will **actually work to secure a better world?**

In a sharp, sober piece about the meaning of left-wing political violence in the 1970s, Tim Barker writes “If you can’t acknowledge radical violence, radicals are reduced to mere victims of repression, rather than political actors who made definite tactical choices under given political circumstances.” **The problem**, as Barker goes on to imply, is those tactical choices: in today’s America they will essentially **never break on the side of armed opposition against the state**. The government knows everything about you, I’m sorry to say, your movements and your associations and the books you read and the things you buy and what you’re saying to the people you communicate with. That’s simply on the level of information, before we even get to the state’s incredible capacity to inflict violence.

Look, **the world has changed**. The relative military capacity of regular people compared to establishment governments has changed, especially in fully developed, technology-enabled countries like the United States. The Czar had his armies, yes, but the Czar’s armies depended on manpower above and beyond everything else. The fighting was still mostly different groups of people with rifles shooting at each other. If tomorrow you could rally as many people as the Bolsheviks had at their revolutionary peak, you’re still left **in a world of F-15s**, **drones**, and **cluster bombs**. And that’s to say nothing of the fact that establishment governments in the developed world can rely on the **numbing agents of capitalist luxuries** and the American dream to damper revolutionary enthusiasm even among the many millions who have been marginalized and impoverished. **This just isn’t 1950s Cuba**, guys. **It’s just not**. In a very real way, modern technology effectively lowers the odds of armed political revolution in a country like the United States **to zero**, and so much the worse for us.

**This isn’t fatalism**. It doesn’t mean there’s no hope. It means that there is **little alternative to organization**, to changing minds through **committed political action** and using the available nonviolent means to create change: a concert of grassroots organizing, labor tactics, and partisan politics. Those things aren’t exactly likely to work, either, but they’re a **hell of a lot more plausible than us dweebs taking the Pentagon**. Bernie Sanders isn’t really a socialist, but he’s a social democrat that moves the conversation to the left, and if people are **dedicated** and **committed to organizing**, the local, state, and national candidates he inspires will **move it further to the left still**. You got any better suggestions?

Listen, commie nerds. My people. I love you ~~guys~~. I really do. And I want to build a better world. **Not incrementally, either**, but with the kind of **sweeping and transformative change** that is required to fix a world of such deep injustice. But **seriously**: none of us are ever going to take to the barricades. And it’s a good thing, too, because we’d probably find a way to shoot in the wrong direction. I can’t dribble a basketball without falling down. American socialism is largely made up of bookish dreamers. I love those people but they’re not for fighting. And even if you have a particular talent for combat, you’re looking at fighting the combined forces of Google, Goldman Sachs, and the defense industry. Violence is hard. Soldiering is hard. In an era of the NSA and military robots, it’s really, really hard. “Should we condone revolutionary violence?” is dorm room, pass-the-bong conversation fodder, of **precisely the moral and intellectual weight** of “should we torture a guy if we know there’s a bomb and we know he knows where it is and we know we can stop it if we do?” It’s built on **absurd hypotheticals**, propped up by the power of anxious machismo, and undertaken to **no practical political end**. It’s understandable. I get it, I really do. But it’s got nothing to do with us. The only way forward is the **grubby, unsexy work of building coalitions** and asking people to climb on board

### 1AR---AT: Alt Solves Case

#### Public R&D causes crowd-out and impedes private investment.

Marino et al. 16, \*Marianna Marino and Stephane Lhuillery, ICN Business School, Department of Strategy and Entrepreneurship; \*Pierpaolo Parrotta and [Davide Sala](https://www.sciencedirect.com/science/article/pii/S0048733316300555#!), Aarhus University, Tuborg Research Centre for Globalization and Firms; (June 17th, 2016, “Additionality or crowding-out? An overall evaluation of public R&D subsidy on private R&D expenditure”, https://www.sciencedirect.com/science/article/pii/S0048733316300555)

6. Discussion and conclusions

This paper is an overall evaluation of the public subsidies to R&D, which proposes an assessment of this policy in absence or combination with the R&D tax credit, an equally important policy instrument used to stimulate private R&D investments. Using a dataset of French companies that covers the period 1993–2009, we perform both inter-group and intra-group assessment of the outcome of this policy. The former analysis is directed to investigate a differentiated impact of R&D grants across differently funded firms, and is presented alongside utilization of the categorical matching method. The latter analysis investigates the implications of the current modulation of public intervention for similarly funded firms. Implemented by means of a continuous treatment evaluation method, the intra-group assessment allows us to investigate the likelihood of crowding-in and crowding-out effects within each tercile along the distribution of the public R&D support grant. Both methods are coupled with the DID approach to account for unobserved heterogeneity and results strengthened by a rich dataset featuring comprehensive information on the pre-treatment variables. In addition, exploiting the exogenous variation due to the sharp change in R&D tax [credit policy](https://www.sciencedirect.com/topics/economics-econometrics-and-finance/credit-policy) that occurred in 2004, we compare [treatment effects](https://www.sciencedirect.com/topics/economics-econometrics-and-finance/causality-analysis) on growth of R&D private expenditure between before- and after-reform periods, and therefore we identify the effects of such a policy change introduced by the government.

Our results show that substitution between private and public funds may occur, especially for medium-high levels of public subsidies, and under the regime of R&D tax credit. Recipients of larger doses appear not to outperform or to perform worse than recipients of lower doses or non-recipient firms. Crowding-out seems stronger and more significant in the after-reform period as reported in both the propensity score and exact matching analysis performed by year. In addition, we find evidence of more extensive negative effects for firms employing fewer than 100 employees or operating in low R&D intensive industries. When analyzing the intra-tercile distribution of public funds under R&D tax credit regime, we highlight a considerable reduction in the growth of private R&D expenditure among medium-high subsidy recipients, whereas additionality effects are found for a few top beneficiary companies (above EUR 10 million). In the sample of fully supported recipients, it seems to emerge – on average – that firms receiving subsidies between EUR 145 thousand and 1.8 million exhibit significant lower private contribution with respect to their counterfactual units. Subsidy-only recipients instead show significant substitution of private with public R&D resources for subsidy doses between EUR 20–55 thousand. Interestingly, when dividing the sample in before- and after-reform periods, we find that crowding-out effects seem to persist solely for recipients of subsidies under tax credit incentives after the 2004 reform.

Overall, our findings appear to suggest a substantial re-design of both the modulation and targeting of the public R&D subsidy policy, especially under R&D tax credit regime. Indeed, the substitution effects emerging from the inter-tercile and funded versus unfunded comparisons would motivate a better targeting of the recipient firms, especially among [small and medium size firms](https://www.sciencedirect.com/topics/economics-econometrics-and-finance/sme) and in low R&D intense industries. Concerning the modulation of the public R&D subsidy provision, it appears opportune to move resources from medium-high to top beneficiary recipients to boost the growth of private R&D expenditure and rise the private contribution to R&D in the economy. Furthermore, the distinction between fully funded from subsidy-only recipient firms underlines the importance of accounting for “hidden treatments” that may otherwise affect the policy evaluation and favor misleading implications. In addition, the 2004 reform of R&D tax credit appears to have lowered the effectiveness of public R&D funding. Although this result shed some lights on the effects of the 2004 reform, it also asks for further research to investigate the opportune mix of such R&D policy tools. Finally, it is worth underlining that a potential limitation of our study is due to the fact that we do not observe companies with fewer than 20 employees in the manufacturing industries, a significant proportion of the French firm population.

This overall assessment indicates that an ex-post evaluation of the targets of an R&D policy is desirable, if not necessary in a time of downturns or economic stagnation. In fact, if R&D funding is seen as a valid policy instrument to support companies hit hard by a crisis and facing financial restrictions, it is inevitable that public resources should not be re-directed away from risky and promising research projects toward companies that would likely perform equally well without this funding.

#### A centralized, planned-economy is structurally unable to mimic the social and economic environment that cultivates innovation.

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However, history shows that socialism is not good at disruptive innovation (Kornai 2013). Compared with capitalist economies, why are socialist economies unable to invent revolutionary products? In addressing that question, Kornai examines the characteristics of the innovation process in capitalist and socialist economies (Table 1). Factors (A), (C), (D) and (E) in Table 1 are related to competition and conflicts between winners and losers in that process, which are substantially different when they have hard budget constraints (HBCs) in capitalism and SBCs in socialism. An HBC is a critical factor in fostering disruptive innovations, and this factor is the foundation of the Schumpeterian creatively destructive process. As Kornai (2013, p. 34) notes, “[T]he Schumpeterian process of innovation ... has inevitably two sides: many projects are needed for the few great successes, and at the same time, we get too many of them”. The upside is the creation of new products. The downside is that destruction implies the bankruptcy of old firms (HBC) and the “extinction” of old products. That disadvantage is an essential part of the Schumpeterian process and necessary for innovation and vibrant market mechanisms. However, only capitalism supports HBCs (Kornai et al. 2003), which provide conditions for investing in promising projects and rewarding successful entrepreneurs (Kornai 2013, p. 15). By contrast, in socialism with SBCs, loss-making firms are protected from going bankrupt, and innovation proceeds through a bureaucratic planning mechanism. Consequently, investment in R&D is confined to a small number of politically favored projects, and the rewards for success are inadequate (Kornai 2013, p. 15).