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### FTC Adv

#### Disruptive antitrust is inevitable -- streamlining data evaluation under computational antitrust solves asymmetries

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Antitrust 1.0 appeared in 1890 with the Sherman Act and was introduced in Europe with the Treaty of Rome in 1957. It has been shaped by several schools of thought (antitrust 1.1 for the Brandeis School, antitrust 1.2 for the Roosevelt School...), but always within the framework of a textual interpretation. Antitrust 2.0 then came along with the Chicago School in the early 1960s (antitrust 2.1 being the Harvard School, antitrust 2.2 the post-Chicago School...). Antitrust law became more economical to fit with the dynamic sectors falling within its scope. The method matched the subject matter. Antitrust 3.0 is emerging but remains incomplete. It appeared in the early 2010s when antitrust agencies have shifted their focus on the issues related to the digital economy. But while there are passionate discussions about the practices implemented by digital players, the use of technological tools to address them is very little debated. This disconnection between diagnosis and treatment is becoming problematic. Antitrust agencies struggle to remedy anticompetitive practices in increasingly complex, fast-paced, and evolutive markets. Soon, firms will also suffer from this struggle leading to fewer decisions and well-informed guidelines. Legal certainty will decrease while the number of judicial errors will be on the rise. Against this background, one must increase antitrust law with new technologies to make antitrust 3.0 complete. Enters “computational antitrust.”1 The present article first explains what it is (I) before discussing its potential (II), and the challenges ahead (III). I. What is Computational Antitrust? First, this article discusses the core idea and concepts behind computational law (A), after which it introduces computational antitrust (B). As one shall explain, the challenges encountered by the jurists, philosophers, and mathematicians in computational law matters are also found in computational antitrust. A – Computational Law Computational law is a “branch of legal informatics concerned with the mechanization of legal analysis (whether done by humans or machines).”2 Computational law is today a subject of growing enthusiasm,3 although the idea to compute the law is centuries old. German philosopher Gottfried Wilhelm Leibniz (1646–1716), known for his defense of rationalism, argued in the 17th century that each legal question has a single answer.4 From then on, “if controversies were to arise, there would be no more need of disputation between two philosophers than 1 See between two accountants. For it would suffice for them to take their pencils in their hands and to sit down at the abacus and say to each other (with a friend if they wish): Let us calculate.”5 Other philosophers like Jeremy Bentham also argued that codifying the law would help make it more practical and accessible6—which Emperor Napoleon did in France.7 With that in mind, Leibniz and his descendants always faced the difficulty of codifying the entire law, which, being the product of natural languages, could not be fully consolidated. Today, digital technologies give new life to these ambitions aspiring to mechanize the rule of law in its entirety (enforcement included).8 Of course, technologies are subject to combinatorial evolution, making it very difficult to forecast which form they will take.9 One can nonetheless imagine a world in which artificial intelligence (“AI”)10 and blockchain combined with quantum computing will soon provide valuable support by enabling a better understanding of the world’s complexity, and eventually, capturing part of it. Today already, multiple computational tools are currently being deployed in legal fields, such as data mining, machine learning, deep learning simulations, natural language techniques, social epidemiology, document management, legal text analytics, computational game theory, network analysis, and information visualization.11 These tools capture rich and detailed data about the external world, make them computable,12 and process them to reach a broader and more granular level of analysis.13 In the end, all pointers indicate that computational methods will first supplement the functioning of our legal system and will end up taking over a large part of it.14 This substitution process will trigger critical questions. Getting ready for it—and, eventually, for shaping it—requires discussing which principles ought to be preserved and developed. The study of computational law as a complement, which it currently is (i.e., a way to automate processes and improve existing analyses), might be our best shot at it. B – Computational Antitrust Markets are becoming increasingly complex and dynamic in today’s economy.15 This complicates the task of antitrust agencies, each day a little more. Against this background, the implementation of computational methods is becoming necessary to maintain and improve antitrust agencies’ ability to detect, analyze, and remedy anticompetitive practices.16 These tools and methods are rarely used in antitrust law today, in fact, most antitrust agencies are just beginning to acquire the technical expertise to develop and use them. Eventually, computational tools should be widely adopted and allow the integration of more variables in anticompetitive cases, whether from economic theory, business and management science, computer science, statistics, or behavioral insights.17 These tools will also simplify merger control, freeing up some of the teams within each antitrust agency. Accordingly, one must want to explore where and how to develop computational antitrust—a specialist field of computational law that purports to improve antitrust analysis and procedures by assistance of legal informatics.18 II. The Potential of Computational Antitrust The development of computational antitrust benefit enforcers, policymakers, and companies in all areas of antitrust law. That applies to anticompetitive practices (A), merger control (B), and the design or monitoring of antitrust policies (C). A – Anticompetitive Practices First, computational tools benefit agencies by increasing the availability of data about markets. In doing so, they help creating new forensics capabilities by increasing the flow of information available to agencies (therefore reducing Hayekian informational asymmetries), and, as a result, improving their ability to detect antitrust infringements.19 These tools are most welcomed considering that antitrust agencies are (to this day) mostly relying on reactive methods (such as leniency applications) for detecting collusion20 whereas their effectiveness is declining.21 Considering that technologies—such as powerful AI systems and blockchain—help market players implement and sustain their anticompetitive practices, the use of computational tools (as a proactive response) is becoming necessary.22 Against this background, the development of new market screening tools could help to identify anticompetitive patterns and behaviors.23 Machine learning will prove helpful in that regard.24 Techniques of natural language understanding could also automate the identification of illegal intentions when analyzing companies’ internal documents.25 The more complex (and dynamic) the practices, the more useful these tools will be.26 In the long term, one can imagine that application programming interfaces (“APIs”) will facilitate the transformation of data into information and create new channels for the automatic sending of certain data from companies to agencies, and vice versa.27 Second, computational tools enable agencies to process data more efficiently and understand practices better.28 They are indeed improving the speed by which agencies analyze documents. For example, these tools have allowed the European Commission to study 1.7 billion search queries for its investigation in the Google Shopping case.29 In this respect, computational tools are bringing the “law time” closer to “market time.”30 Besides, computational tools increase agencies’ analytic capacities. They do so by allowing the comparison of large data sets across different periods and industries to detect anomalies.31 These tools also enable agencies to integrate data from other agencies.32 Much can be done to improve the cross-institutional use of data residing within different agencies from a same country. Similarly, the international dialogue between antitrust agencies, which is currently ensured by various networks such as the ICN, the OECD, and the ECN+, could be further automated. Simultaneously, computational tools enable market players to conduct more thorough internal audits. In the future, one could imagine the design of new tools for assessing compliance with antitrust laws (almost instantaneously). It would require companies to compute the known parameters of any practice and assess the associated legal liability risk thanks to algorithms trained to antitrust laws. One could imagine that antitrust agencies will provide companies with their own computational tools to evaluate the risk even more accurately. These tools could improve over time using deep reinforcement learning models.33 B – Merger Control Merger control differs from investigations of anticompetitive practices. As it turns out, these differences have implications for computational antitrust. First, antitrust agencies must make a decision in all the concentrations notified to them. And they have a limited time to do so. As a result, the probability that agencies are making decisions under uncertainty is greater in merger control than in anticompetitive cases where they pick investigations that may go on for long periods. The more documents there are, the greater the uncertainty considering that agencies may face great complexity during the analytical process.34 For example, the European Commission has examined over 2.7 million documents in the merger between Bayer and Monsanto.35 The Department of Justice has been facing similar issues.36 These difficulties in processing all the data (in the allotted time) is problematic considering that data are the backbone of merger analysis.37 Computational antitrust could then prove helpful by providing agencies with the tools to analyze extensive data sets within the time constraint.38 Second, companies are very much in charge of the data being sent—as there are no injunctions to produce specific records, no dawn raids, and no discovery procedures (where applicable). It creates a first asymmetry between companies and agencies. For example, the European Commission underlined in Dow/DuPont that “the Parties did not mention their internal databases on crop protection patents and did not provide their competitive intelligence reports on competitors’ crop protection patents in their responses to several initial Commission’s requests for information.”39 This made the analysis more “difficult” than it should have been.40 At times, this asymmetry even leads to questioning the integrity of the data. In the WhatsApp case, for instance, the Commission imposed a €110 million sanction on Facebook for providing misleading information.41 Once the agency has received the data, it processes it without sending it back to the companies.42 That triggers a second asymmetry, thus making merger procedures more obscure than they could be. Computational antitrust could fix these asymmetries by introducing a systematized communication tool between companies and antitrust agencies. It could ensure that companies send (in realtime) agencies all information in specified databases and that firms get access to it once it has been processed.43 Besides, one could use blockchain for creating immutable databases and ensure their integrity.44 Finally, one can imagine that computational tools will ultimately lead to more dynamic merger analyses.45 Automated processing of big data is already allowing agencies to understand market power better. The first advances in computational antitrust have been made in that field starting in the mid-1990s thanks to simulation models’ implementation.46 They are used, for example, to measure product substitutability or efficiency claims.47 Over time, computational methods will open new possibilities. One could think that they will allow companies and agencies to understand the competitive pressure between non-substitutable products, to quantify dynamic capabilities, and model pro-innovation policies.48 Static variables will slowly make room for dynamic ones, if so desired. C – Antitrust Policies Computational methods will benefit the design, monitoring, and evaluation of antitrust policies. This will be achieved thanks to a combination of retroactive and predictive analyses. First, computational techniques will improve retrospective of antitrust investigations, merger control decisions, and public policies. These retrospectives are notoriously challenging, and costly, to conduct. To be sure, antitrust agencies carry out high-level retrospective analyses in their annual activity reports, but these studies are mostly qualitative, and the level of aggregation is high. Recently, several agencies—including the Federal Trade Commission and the French antitrust agency49—have expressed their intention to conduct more targeted empirical studies for analyzing past merger decisions involving large digital firms.50 Using a computational approach, agencies could carry out similar studies regarding their jurisprudence in which anticompetitive practices have been punished. After sanctions have been imposed, the (automatic) collection of market data could, for example, provide valuable information on their effectiveness, whether they are strictly monetary or also including structural and behavioral remedies.51 They could also better estimate consumer savings thanks to their decisions and orient them accordingly.52 Furthermore, antitrust agencies could systematically audit their processes to ensure they stay effective in a fast-changing technological environment.53 Finally, they could carry out empirical studies of specific industries,54 for example, to understand what conditions have allowed the emergence of new players when the market was deemed to have tipped.55

#### Big data uses data asymmetries to crush nascent competitors.

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Before the Big Data era, dominant tech firms were less aware of what their customers and rivals were doing (or planning to do). As Chapter 2 discusses, some platforms have a relative advantage in accessing and analysing data to discern consumer trends well before others. As we saw, companies can nowcast, ie, ‘predict the present’ by using search inquiries, social network postings, tweets, etc. Nowcasting can yield a competitive advantage. Hedge funds, for example, are nowcasting to see in real- time how market forces are affecting portfolios, such as how many cars are in the Wal- Mart parking lots across the country.32 In monitoring search queries, Google can predict flu outbreaks well before the government health agencies can. Twitter’s data can help companies identify emerging trends. Google and Apple, in controlling the mobile phone app stores, immediately know when users download rivals’ apps. As the UK competition authority observed, A number of third party firms also now offer tools and services that enable first parties to gain insights on how their brands and products are being discussed online (sometimes referred to as ‘social listening’, ‘opinion mining’ or ‘sentiment tracking’). By analysing the extent to which they are mentioned in social media content (such as blogs, microblogs, forums, news sites and social network sites), whether trends are positive or negative and why, firms can adjust their marketing activity.33 Nowcasting represents a potent data- based weapon, not previously available for monopolies, to monitor new business models in real-time. The data- opoly can use its relative advantage in accessing and processing personal data (such as watching for trends in its proprietary data from posts on a social network, search queries, emails, etc) to quickly identify (and squelch) nascent competitive threats. The dominant firm can acquire entrants before they become significant competitive threats or blunt the entrant’s growth (such as manipulating its search engine results to make it harder to find the company34). For example, Facebook warns its investors that its ‘[p] latform partners may use information shared by our users through the Facebook Platform in order to develop products or features that compete with us’.35 Thus, it is as if the monopoly invented a radar system to monitor in real-time the competitive portals. It can track nascent competitive threats shortly after they take off, and intercept or shoot them down long before they become visible to regulators and others. Moreover, the courts and agencies, if they follow the UK competition authority’s logic in Google/ Waze, will find that the distant planes pose potential (yet speculative) threats, and will have insufficient evidence to prove that competition was likely harmed. The monopolist, however, is not troubled by the overall welfare effects in shooting down or intercepting the planes. Granted, the monopolist may damage its reputation, if it acts too brazenly, but reputational concerns generally do not inhibit some monopolies from raising prices. For entrants, there is the potential reward of being acquired. But there are also casualties when the monopoly shoots down others. If the blown-up planes come easier to mind, then some potential entrants (or funders), under the availability heuristic, may amplify the risk, and decide not to leave the runway. And the competition authority cannot force (or incentivize) entrants to fly towards the monopolist armed with this radar. The European Data Protection Supervisor asked competition officials to consider (in coordination with privacy and consumer protection officials) the following issues: • first ‘how the control of personal information contributes to market power in the digital economy and the implications for data protection’ and • second ‘the risks to the consumer posed by concentrations and the abuse of market dominance where firms process massive amounts of personal data’.36 Big Data can help prolong monopolies in at least two ways: data-driven network effects and this unique ‘nowcasting’ radar. In accessing consumer and other market data in real-time, some dominant firms can quickly detect and squelch competitive threats and close competitive portals. F. Keeping the Competitive Portals Open Competition law, when effectively enforced, can deter exclusionary and predatory practices and keep competitive portals open. After all, it is easier for the creative destruction to breeze through a window screen than topple a concrete wall. Big Data, as we saw, can confer power and a durable competitive advantage.37 Data-driven network effects can improve the product’s or service’s quality. Firms like Google thrive (and serve their users) by gathering as much data as possible to personalize search results. At times, consumers benefit from this competitive rivalry and drive to maintain a data-advantage. Companies innovate to expand their platform of services to secure a greater following. No one, for example, questions Google’s investment in technology.38 But when the stakes are greater, so too are the incentives to engage in unfair practices to tip the market in one’s favour and maintain a monopoly.39 Consequently, competition authorities must be alert to dominant companies’ unfair practices to thwart competitors and disruptive innovators. We outline below several potentially anticompetitive data-driven tactics. 1. Exclusive dealing toÂ€prevent rivals from accessing critical data One historic concern is when a monopoly, through exclusive dealing, deprives its rivals of a needed resource. For example, aluminium producers to extract aluminium from alumina, require a ‘very large amount of electrical energy, which is ordinarily, though not always, most cheaply obtained from water power’.40 To foreclose other aluminium producers, Alcoa in its contracts with several hydro-power companies, illegally added covenants binding the power companies not to sell or let power to anyone else for the manufacture of aluminium.41 Likewise, the European Commission considers that ‘such input foreclosure is in principle liable to result in anti-competitive foreclosure if the exclusive supply obligation or incentive ties most of the efficient input suppliers and customers competing with the dominant undertaking are unable to find alternative efficient sources of input supply’.42 Data in our industries is a critical input. Thus one obvious concern would be for a dominant firm to foreclose its rivals’ timely access to critical data. The DOJ had this concern in the Google/ITA Software case, where it prevented Google post-merger from restricting, through exclusive dealing, its rivals’ access to the airlines’ seat and booking class data.43 And in a merger between advertising firms, the European Commission inquired whether the competitors would still have access to ‘big data’ from other providers if post-merger, the merged entity were to develop its own ‘big data’ analytics platform, and deny access to its competitors.44 2.â•‡ Exclusionary practices toÂ€prevent rivals fromÂ€achievingÂ€scale As the US Court of Appeals for the Eleventh Circuit noted in 2015, a monopoly can violate section 2 of the Sherman Act when its exclusive dealing programme deprives smaller rivals of ‘distribution sufficient to achieve efficient scale, thereby raising costs and slowing or preventing effective entry’.45 So too a dominant data-driven company can use exclusionary tactics to prevent rivals from achieving the minimum efficient scale.46 Scale, as Chapter 12 discusses, can be especially important in data-â•‰driven industries, such as search and search advertising. We saw, for example, how increasing the volume of both ‘tail’ and popular search queries can improve the quality of the search algorithm’s results. In unfairly preventing smaller rivals and potential entrants from accessing critical data, the dominant firm can use the network effects (learning-by-doing, scope, and spill-over effects) to widen the quality gap over rivals, attract more users and advertisers, and expand its platform.47 The Federal Trade Commission (FTC) Bureau of Competition staff, from the released portions of its inadvertently produced report, recommended suing Google for several unfair practices. (The FTC Commissioners instead closed the investigation after Google voluntarily agreed to change some practices.) The FTC legal staff discussed the competitive significance of data and ‘substantial scale effects’ in the Internet search, search advertising, and search syndication markets.48 One alleged anticompetitive practice was Google’s use of exclusivity provisions to prevent its rival Microsoft from achieving scale, including the volume of search queries it received. Google used contractual restrictions, according to the FTC legal staff, to deny Microsoft critical scale and impair its ability to compete effectively in the markets for general search and search advertising.49 One can access a search engine in various ways, such as the browser one uses. Twenty companies (including AOL), the FTC legal staff found, account for 90 per cent of all search query volume. To steer users to its search engine, a search engine provider (like Google, Microsoft, or DuckDuckGo) can enter into distribution agreements with these entry points, namely hardware manufacturers, independent software vendors, and Internet service providers, ‘to distribute toolbars and establish default settings that direct user searches to [its] search engine’.50 Google, the FTC legal staff reported, had exclusive or restrictive agreements with four of the top five companies, and 12 of the top 20.51 Google, for example, is the default engine on Apple’s Safari Internet browser. Google reportedly paid Apple USD 82 million in 2009, and USD 1 billion in 2013 and 2014 for this partnership.52 Google’s internal documents, the FTC legal staff found, showed that ‘Google’s interest in renewing deals with some of its largest syndication customers may have been, in part, to keep Microsoft from gaining scale’.53 Interestingly, Amazon decided it was in its long- term interest to funnel some query volume to Microsoft’s Bing, even if it was losing money on each query.54 One wonders why others did not do this. Perhaps, as the European Commission generally noted from its market investigation, the distributors’ major concern was Google’s bargaining power.55 3. Dominant firm leverages its data- advantage in a regulated market to another market We saw in Chapter 9 how the regulated French energy monopoly GDF Suez was using its vast customer database to target customers in the unregulated market with deals on gas and electricity.56 Since 2007, French gas customers could opt for the regulated tariffs, which only the incumbent operator GDF Suez offered, or the ‘market’ offers, which GDF Suez and its new rivals offered. In making its market offers, GDF Suez had an unfair advantage over its rivals. It was using the data it collected as a regulated monopoly to target customers with customized offers based on their usage. The personal data in question was commercially valuable. With the data a company could precisely locate gas consumers, identify their consumption level, and propose offers better suited to their profile.57 The data was unavailable to the monopoly’s competitors. Nor could the competitors replicate this data. Moreover, the database was not the ‘product of a specific innovation that GDF Suez may have introduced’ but was ‘merely inherited from its former status as monopolistic gas supplier’.58 GDF Suez was found in 2014 to have abused its dominant position. In a similar case, the Belgian Competition Authority in 2015 fined the National Lottery EUR 1,190,000 for abusing its dominant position when launching its sports betting product Scooore!59 Here, too, the defendant used the data it collected as a legal monopoly in organizing public lotteries to enter the sports betting market. The monopoly used the contact details of persons registered in its database to email them about launching Scooore! The National Lottery ‘did not acquire these contact details following competition on the merits but in the context of its legal monopoly’.60 Nor could competitors reproduce the data ‘at reasonable financial conditions and within a reasonable period of time’.61 In both cases, the dominant firm acquired the data through its legal monopoly. Monopolies in other industries may distinguish these cases. For example, they might have amassed the data following competition on the merits, such as an innovative app. That would be a closer call. But if the firm used other unfair tactics to attain or maintain its dominant position, then arguably using the valuable consumer data from its illegally maintained or attained monopoly is not competition on the merits. Even here, the competition authority must show why competitors could not reproduce the data under reasonable financial conditions and within a reasonable time period. 4.â•‡ Increasing customers’ switchingÂ€costs To maintain its data-advantage and prevent rivals from attaining scale, a monopoly may make it harder for its customers to leave. Customers, if they are locked-in, will continue to supply the monopoly (rather than its competitors) with data. The basic premise is that as the time and cost needed to switch products or services increase, the greater the customer is locked- in, the harder it will be for rivals to attract users and achieve scale. This is especially the case where consumers cannot readily predict the long- run costs in using that platform or its quality levels over time.62 Network effects, as we saw, can increase users’ switching costs. For example, users concerned over Facebook’s privacy policies may want to switch to another social network. But unless they can get their friends, family, and acquaintances to switch, they will likely stick with Facebook (if they continue using a social network). This lock- in effect, by itself, does not violate the competition law. Other users’ utility can increase as more join the social network, as they have more people to befriend online. But a firm can abuse its dominant position by undertaking additional actions, the net effect of which is to increase users’ switching costs and the firm’s power. One way, in the European Commission’s case against Microsoft, is to reduce the interoperability with other systems or platforms.63 Likewise, in its Facebook/ WhatsApp investigation, the Commission inquired, among other things, whether: • users of the consumer communications apps were locked in to any particular physical network, hardware solution, or anything else that needed to be replaced in order to use competing products; • the parties controlled and limited the portability of users’ data; and • the parties had any means to preclude competitors from recreating a user’s network on the parties’ applications.64 Presumably, if the answer was yes, the risk of anticompetitive unilateral conduct increases. Facebook and WhatsApp users, the European Commission concluded, could easily port their contact data to other texting apps. (Moreover, texting data, the Commission found, had little long- term value.) But if consumers invested a lot of time and effort in the service, such as a homepage with photos, timeline, updates, etc, and the dominant firm blocked customers’ ability to port their data, when data portability was technologically feasible, that would raise antitrust concerns. The switching cost can be as subtle as setting the app or service as the default option, thereby requiring consumers to opt out each time they want to use another service. 5.â•‡ Vertical integration byÂ€a dominant platform operator We saw in Chapter 14 why platforms are worth billions, while apps are worth millions. Apple and Google have significant power in effectively controlling the respective mobile operating systems iOS and Android.65 Both Google and Apple have business interests in ‘targeted advertising’ and ‘run the two biggest services, by revenue, for putting advertisements on mobile phones’.66 Google especially relies on personal data for maintaining a competitive advantage for advertising.67 As such, they have a greater incentive to prevent the personal data being diverted (as well as individuals’ using rival apps). To maintain and secure fresh sources of valuable data, Apple and Google have greater opportunities to introduce their own applications and foreclose rival applications on their smartphone platforms. Thus there is a greater risk of exclusionary behaviour.68 Competition authorities are sensitive to vertical integration by a dominant platform operator (ie where it also becomes a seller on its platform). The platform’s incentives now change, as it may earn greater profits by steering users and advertisers to its own products and services to the detriment of rival sellers (and contrary to consumers’ wishes). The platform has a ‘frenemy’ relationship with the independent application developers.69 The platform and independent apps are friends—â•‰in that both benefit as more users and complementary software developers are attracted to that platform, as opposed to rival platforms. Such will be the case when it is costly or time- consuming for independent software developers to customize, promote, and update their apps across multiple platforms or where one platform imposes greater restrictions on functionality, terms of sale, advertising, etc. The platform operator, however, is also competing with the independent software developer’s app, and thus an enemy.70 As the Organisation for Economic Co- operation and Development (OECD) warned, the platform owner ‘may seek to exclude third- party applications developers, either to protect its own vertically integrated applications subsidiary or to prevent the emergence of a potentially competing platform’.71 Thus in its Facebook/ WhatsApp investigation, the European Commission inquired whether: • the parties controlled any essential parts of the network or any mobile operating system; and • the parties’ applications were pre- installed on a large base of mobile phones, tablets, or PCs, and if so whether ‘status quo bias’ could potentially affect consumers’ choices.72 Likewise, Facebook in 2015 warned investors of the risk of the dominant mobile platforms inhibiting Facebook’s apps or preferring their own programs or services.73 So did Twitter, LinkedIn, Yelp, and smaller online platforms, like Coupons.com. They all noted their dependence on the Apple and Android mobile platforms.74 They recognize that web usage is increasingly shifting to mobile platforms such as smartphones and other connected devices.75 Their business growth and success depend on their interoperability with the popular mobile operating systems that they do not control.76 So one significant business risk is if the mobile super- platforms— Apple and Google (and to a much lesser extent Microsoft)— change the mobile operating systems that degrade the functionality of the independent apps and online platforms— like Twitter, Yelp, or Coupons.com— or give preferential treatment to their own similar services or competitive services. Facebook identified several potential anticompetitive measures by the mobile superplatforms including: • degrading the independent app’s functionality, • reducing or eliminating the independent app’s ability to distribute its products, • giving preferential treatment to competitive products, or • limiting for any app whose revenues are primarily from advertising its ability to deliver, target, or measure the effectiveness of ads, or imposing fees or other charges related to its delivery of ads.77 In its 2012 Annual Report, Facebook warned that ‘[c] ertain competitors, including Google, could use strong or dominant positions in one or more markets to gain competitive advantage against us in areas where we operate including: by integrating competing social networking platforms or features into products they control such as search engines, web browsers, or mobile device operating systems; by making acquisitions; or by making access to Facebook more difficult.’78 Facebook, given its apps’ strong consumer appeal, has less to fear than smaller, lesser known apps. To make it harder for consumers to access and use the smaller independent apps on their smartphones, the super- platform could: • degrade the independent app’s functionality by having it run slower than the operating system’s app,79 • reduce or eliminate the independent app developer’s ability to distribute its app by making it harder for consumers to find the app on its search engine or app store,80 • limit a competing app’s revenue stream by excluding the app from its online wallets, such as Apple Pay and Google Wallet, or • give preferential treatment to its own products, by pre-loading its app on the smartphone, having it on the opening screen,81 or integrating its own products into its other popular products, including its search engine and the operating system. These concerns are real. One example is Bankrate Inc. Its website allows users to compare online the rates of over 300 financial products, including mortgages, credit cards, automobile loans, money market accounts, certificates of deposit, checking and ATM fees, home equity loans, and online banking fees. As the Internet’s ‘leading aggregator of financial rate information’, Bankrate, according to its website, ‘continually surveys approximately 4,800 financial institutions in all 50 states in order to provide clear, objective, and unbiased rates to consumers’.82 During the fourth quarter of 2015, Google began testing a competing service called Compare Credit Cards. Google’s search engine displayed its own service more prominently on credit card- related search results than Bankrate’s service.83 The fallout was significant. First, Google’s actions ‘adversely affected’ Bankrate’s ‘Credit Cards segment growth and profitability’.84 Second, Bankrate’s stock price, after this news was released, declined 48 per cent in one day, a record drop for the 40- year old company.85 Bankrate’s stock plummeted even though Google earlier announced that it was terminating its Compare services, including Compare Credit Cards.86 Investors were still jittery. Bankrate, along with many other companies, depends on Google’s search engine to attract a significant portion of visitors to its website. As one analyst commented, ‘Bankrate faces an uncertain future, in our opinion, as its ability to maintain low- cost traffic and consistent monetization appears threatened by changes over which it has little control’.87 The browser war between Microsoft and Netscape in the 1990s is another example. The DOJ challenged several actions Microsoft took in integrating its Internet Explorer browser into its Windows operating system. In technologically binding its browser to Windows, Microsoft, the district court found, both prevented original equipment manufacturers from pre- installing other browsers and deterred consumers from using them.88 The US Court of Appeals for the DC Circuit affirmed that Microsoft’s commingling of its browser and operating system code violated section 2 of the Sherman Act.89 So, too, the super- platform can abuse its dominant position by fusing its app with its operating system code, when it does not achieve any real integrative benefits, but helps maintain its data-advantage and monopoly by reducing users’ likelihood of using competing apps. Moreover, data- driven exclusionary conduct may unite some within the Chicago and post- Chicago Schools. University of Chicago professor Dennis Carlton is a member of the Chicago School. Like others in the Chicago School, Carlton is generally sceptical about antitrust enforcement directed towards exclusionary conduct by a monopolist. Carlton, however, accepts that there is a legitimate role for antitrust in refusal to deal cases in certain situations.90 Significantly, he has argued that antitrust enforcement is appropriate in dynamic industries (such as the computer industry) where network effects are present and where scale is especially important to the ability to compete. He argues that: in a dynamic model, the cost of being small initially can be magnified in later periods, especially with assumptions about network dependencies, importance of installed base, or scale economies. In those settings, strategic behavior designed to keep a rival small initially can yield later significant competitive advantage.91 Carlton finds these conditions satisfied (and enforcement appropriate) in Lorain Journal, where the owner of a local newspaper, which was the major local advertising vehicle, responded to the entry of a local radio station by refusing to deal with customers who advertised on the radio.92 Carlton notes that most commentators have viewed the case as suggesting that radio and newspapers are substitutes, but it is better to view them initially as complements for some advertisers— ways of reaching different demographic groups. However, over time, radio could grow into a substitute. So, Carlton suggests, the exclusionary conduct was ‘designed to so limit the size of the radio station that it could not survive as a vigorous competitor later on’.93 Similarly, Carlton argues that the government’s Microsoft cases were appropriate. The first case involved de facto exclusive dealing by Microsoft, which required computer manufacturers to pay Microsoft a licence fee based not on how many computers they shipped with the Windows operating system but based on how many computers they shipped in total. The second case involved contracts with computer manufacturers that either required or created incentives for exclusivity in browsers. Carlton notes that these cases, similar to Lorain Journal, are properly viewed as limiting potential rivals to the operating system monopoly from attaining efficient distribution.94 The European Commission in 2015 opened a formal investigation involving Google’s Android. Although Android is an open- source mobile operating system, which others can freely use and develop, Google controls the operating system through its licensing agreements. As the Commission stated, the ‘majority of smartphone and tablet manufacturers . . . use the Android operating system in combination with a range of Google’s proprietary applications and services. In order to obtain the right to install these applications and services on their Android devices, manufacturers need to enter into certain agreements with Google.’95 The European Commission is investigating whether Google has • ‘illegally hindered the development and market access of rival mobile applications or services by requiring or incentivising smartphone and tablet manufacturers to exclusively pre- install Google’s own applications or services’; • ‘prevented smartphone and tablet manufacturers who wish to install Google’s applications and services on some of their Android devices from developing and marketing modified and potentially competing versions of Android (so- called “Android forks”) on other devices, thereby illegally hindering the development and market access of rival mobile operating systems and mobile applications or services’; and • ‘illegally hindered the development and market access of rival applications and services by tying or bundling certain Google applications and services distributed on Android devices with other Google applications, services and/ or application programming interfaces of Google’.96 Besides Android, the Commission is investigating several other Google business practices: (i) The use by Google without consent of original content from third-party web sites in its own specialized web search services. (ii) Agreements that oblige third-party web sites (‘publishers’) to obtain all or most of their online search advertisements from Google. (iii) Contractual restrictions on the transferability of online search advertising campaigns to rival search advertising platforms and the management of such campaigns across Google’s AdWords and rival search advertising platforms.97 Moreover, the Commission in 2015 issued its statement of objections over Google degrading the quality of its search results by systematically favouring its own comparison shopping products in its general search results page.98 It bears noting that these allegations have not been proven in court. The Commission’s open investigations as of early 2016 have not reached statement of objections or formal action, and even the statement of objections are preliminary, with Google having the right to respond. Our point here is not Google’s potential liability, but to illustrate the types of abuses by dominant firms that touch on Big Data. To adequately assess these claims, the competition authority and court must understand the competitive significance of the four ‘V’s— volume, variety, velocity, and value— of data, the data- driven network effects, and how these data- driven strategies may help companies attain and maintain their dominant position and leverage their power across markets. G. An Object All Sublime, the Competition Authority Shall

Achieve in Time— to Let the Punishment Fit the Crime Lastly, competition authorities must respond swiftly to prevent data- opolies from benefitting from their unfair data- driven practices. As we saw, data- driven network effects increase firms’ incentives to resort to unfair tactics. As the benefits from illegality increase, so too must the magnitude and probability of punishment increase to deter the anticompetitive behaviour. Otherwise, monopolization pays. In the US, monopolization pays. The DOJ criminally prosecuted more persons in one year under the Migratory Bird Treaty Act (227 in 2012)99 than it has civilly and criminally prosecuted monopolies over the past 35 years (13 since 1980).100 Between 2005 and 2014, the DOJ opened only 19 monopolization investigations, and brought only one case (in 2011).101 Thus a monopoly has more to fear about its wind turbine killing a golden eagle102 than its executives killing off a competitor. In the US, executives conceivably could go to jail for monopolization. Over the past 50 years, Congress has increased the maximum criminal fines and term of incarceration for Sherman Act violations. From a misdemeanour, the criminal penalties now stand as a felony with up to ten years’ imprisonment and a fine up to USD 100 million for corporations and USD 1 million for individuals.103 The Sherman Act does not delineate which conduct should be criminally or civilly prosecuted; this has been left to the DOJ’s discretion. The DOJ, however, has not criminally prosecuted firms or individuals for violating section 2 since the 1970s.104 Since the Reagan administration, the DOJ has criminally prosecuted only horizontal, per se illegal agreements among competitors, such as price-fixing, bid rigging, and customer and territorial allocations. Nor has the FTC brought many monopolization cases.105 The antitrust fines likely represent a fraction of the monopoly profits. This is especially so, when dominant firms can avoid antitrust liability for their abuses in jurisdictions like the US. Class action antitrust lawsuits, under the recent Supreme Court decisions, are harder to bring. If there is a problem with class action settlements in antitrust cases, the American Antitrust Institute found, ‘it is that plaintiffs sometimes settle strong cases for too little, not weak cases for too much’.106 While running for president Barack Obama criticized the Bush administration for having ‘what may be the weakest record of antitrust enforcement of any administration in the last half century’. 107 Obama noted that ‘in seven years, the Bush Justice Department has not brought a single monopolization case’.108 Obama promised to ‘reinvigorate antitrust enforcement’ and ‘step up review of merger activity.’109 Now with his second term coming to an end, the same criticism has been made about his administration.110 Many tech firms’ business models depend on collecting and monetizing consumer data. Several network effects can enable the company to become so firmly entrenched, so dominant in a given market, that it has both the ability and incentive to squelch competition, including by mavericks who challenge that data- dependent business model. When that happens, the incentive to innovate and take on that data- opoly is diminished. Consumers, even though they continue to get many apps and services for free, are nonetheless harmed, including the loss of technology that advances their privacy interests. Although the EU is more active in investigating abuse of dominance cases, this cannot be left to one jurisdiction. Monopolization pays today. The incentives to abuse a dominant position, given the network effects, are even greater in datadriven industries. So, too, are the opportunities, especially for data- opolies with the nowcasting radar or controlling a critical platform, like smartphones. If the competition authorities ignore data- driven exclusionary and predatory conduct, then we will likely see more industries dominated by a few firms. Thus another signpost of progress is when the US and other jurisdictions investigate and swiftly prosecute data-driven abuses.

#### Antitrust big data reformation deters economy wide monopolization

**Stucke and Grunes** **2016**, (Maurice E. Stucke, Douglas A. Blaze Distinguished Professor of Law at the University of Tennessee, where he teaches antitrust, privacy, business torts, law and economics, and evidence, Allen P. Grunes, o-Founder of the Konkurrenz Group in Washington D.C. Mr. Grunes spent more than a decade at the U.S. Department of Justice Antitrust Division, where he led many merger and civil non-merger investigations. *Big Data And Competition Policy*, Oxford Press // DELO

Although some argue that Big Data is a passing fad with no antitrust implications, others, including the Organisation for Economic Co-â•‰operation and Development (OECD) and European Data Protection Supervisor (EDPS), recognize the need for a better understanding of the implications of a data-â•‰driven economy on competition policy, privacy law, and consumer protection.1 Given the rise of data-â•‰driven business models, and the risks and costs in ignoring or downplaying data-â•‰driven mergers, abuses by dominant firms, and anticompetitive business strategies, we cannot afford our competition officials to remain ignorant. Nor can competition agencies simply wait for the right case to present itself, which presents a good theory of harm. If the agency does not understand the competitive significance of the four ‘V’s of data, the competitive benefits and risks of data- â•‰ driven strategies, and the adequacy of its current tools, then it won’t necessarily know which case is the right case, nor will it know what to do with the ‘right’ case when its tools remain ‘price- centric’ for mainly single- sided markets. The competition agencies need to proactively increase their learning and refine their tools. So where should the competition authorities begin? We do not argue for more enforcement, simply for its own sake. We do believe that some competition officials and judges have overemphasized false positives and discounted false negatives. Nonetheless, there is a significant risk of false positives when competition authorities simply enjoin every merger by large tech firms. If Google or Facebook were to acquire Twitter, for example, the data- driven merger would raise many concerns. But we cannot say that the merger on its face violates the competition law. Instead we must have a theory of how the merger may increase entry barriers, help maintain dominance, degrade privacy protections, or empower exclusionary behaviour. So the first step is to recognize the antitrust implications of data- driven mergers and strategies. Competition agencies must avoid the ten myths and pitfalls that we examined in the earlier chapters, such as the temptation to examine the merger’s likely effects only on the ‘paid’ side of a multi- sided market, consider only ‘traditional’ entry barriers, assume that privacy considerations are irrelevant, treat data as essentially fungible, or even worse, assume that data is ubiquitous and inexpensive. Next the competition authorities must acknowledge that their price- centric analysis and categorization of mergers into horizontal, vertical, and conglomerate are ill- suited for data- driven mergers in multi- sided markets, where one side is free. Third, the competition authorities must recognize that firms, in markets characterized with data- driven network effects, may use anticompetitive tactics to tip the market in their favour, and use exclusionary practices to maintain or attain their dominance. Fourth, the competition authorities need to develop tools to screen data- driven mergers and identify categories of data- driven business strategies that likely yield significant pro competitive efficiencies. This last part outlines several steps to help competition authorities, courts, lawyers, and economists towards this end.

#### Ex-post cases fail - flipping presumption is needed to block algorithm collusion against nascent competitors

**ABA 21**, “Artificial Intelligence & Machine Learning: Emerging Legal and Self-Regulatory Considerations Part Two Competition Implications of Big Data and Artificial Intelligence/Machine Learning” Prepared By: American Bar Association, Antitrust Law Section Big Data Task Force February 2021, <https://www.americanbar.org/content/dam/aba/administrative/antitrust_law/comments/october-2019/clean-antitrust-ai-report-pt1-093019.pdf>

In 2020, the FTC began retrospective examinations of past acquisitions made by large technology companies, issuing orders to Alphabet (including Google), Amazon, Apple, Facebook, and Microsoft to provide the FTC with information and documents relating to prior acquisitions not reported to the antitrust agencies under the Hart-Scott-Rodino (HSR) Act.127 The FTC stated that one of the objectives of this investigation is to assess whether large tech companies are making potentially anticompetitive acquisitions of nascent or potential competitors that fall below HSR filing thresholds.128 Government enforcement and private actions involving monopolization and abuse of dominance allegations against large technology companies A threshold question in antitrust inquiries involving digital markets and platforms is the issue of market power. Can there be platform monopolies? As discussed in Section II.b, supra, key economic features of platforms include economies of scale, indirect network effects, and platform differentiation. These features affect the range of optimal antitrust policy. As always, assessments of market power must be grounded in the facts of each case and consider the competitive dynamics of the industries involved. In particular, relevant market definitions for platform services need to take into account multi-homing and network competition. For digital platforms, market share and pricing may not be accurate surrogates for determining market power because of how rapidly markets can shift. Conversely, free or even negative pricing (e.g., rewards for users) on one side of a multi-sided platform is not necessarily evidence of predation, as pricing on both sides of the platform should be considered. Similarly, exclusive contractual terms involving digital platforms reflect competitive necessities for protecting investments, rather than evidence of exclusionary conduct. Another question that often arises in market power inquiries involving digital platforms or services is whether a firm has a data monopoly. There are several challenges in carrying out that inquiry in practice. As a threshold matter, even if there were a data market where data is transacted from one firm to another,129 that market would likely not be a unitary one. That is, the data relevant for AI for self-driving cars would likely not be the same data set relevant for credit decisions. See Section II.b.i, supra. The following factors are likely to be relevant for inquiries of whether a firm has a data monopoly:

• There may be alternatives to the data at issue. For example, governments make available to the public at no cost a variety of data that may be used to develop AI applications.130 Moreover, myriad existing data and emerging data sources may exist because new products and services can generate new data sources, and because there may be many firms specializing in collecting and trading data. Adding to the complication is that the myriad of existing and emerging data sources may make it difficult to calculate market shares. • Platforms may not have control over the data they collect. For example, the right of data portability provided under Article 20 of the EU’s GDPR and other national and local laws131 allows customers to retain greater control over their data, and firms can dynamically bid for access. • Shelf-life for data may be short. Even if a company currently has the most extensive dataset, much of that data may become obsolete after a short time. As a result, even if one could measure market share and even if there was market concentration at a specific point in time, that might not shed any light on future market share/concentration. • Data needs to be processed and analyzed before it can yield valuable information. To that end, data may have little effect on competition. Rather, the availability of and accessibility to the technology for processing data (i.e., AI – technology and personnel) may present a more substantial constraint to new entrants than data. • It is also unclear what the relevant geographic market(s) might be for assessing data competition. While the market may be global since data can be collected, stored, and used in multiple national jurisdictions, certain data may be subject to data localization and cross-border transfer restrictions, creating localized data markets.132 Proper assessment of relevant geographic markets for data in each case should account for the industry conditions, the way data at issue is used, and what alternatives can act as economic substitutes.

Mergers and acquisitions

The predominant tool for competition law with respect to mergers and acquisition is government review. Common concerns about mergers in digital markets relate to the risk that an incumbent firm acquires new or potential future rivals. The pricing models of multi-sided markets, particularly “free” services, and ramp up to monetizing products that first become highly successful before generating much revenues, means that many mergers that might raise significant competition issues do not exceed merger notification thresholds that are set according to revenue. Some jurisdictions such as Germany have already introduced new thresholds based on the value of the transaction.133 In addition, the German Draft Bill (see Section III.d, infra) now proposed would allow the Bundeskartellamt to order certain companies to notify every merger (subject to a minimum revenue threshold) where there are indications that future concentrations may restrict domestic competition.134 In the United States, legislators have proposed creating higher merger thresholds for digital firms,135 and academics have proposed shifting presumptions for mergers and acquisitions in digital markets.136

The following is a summary of federal merger cases in the United States that implicate big data, machine learning, and artificial intelligence. Automatic Data Processing/AutoInfo (1995) In 1995 to 1996, Automatic Data Processing (ADP)’s acquisition of AutoInfo raised concerns that the firm would have an “information monopoly” on the systems used by scrapyards to trade salvage. This acquisition gave ADP control over the market for auto salvage yard 133 Press Release, Bundeskartellamt, Joint Guidance on New Transaction Value Threshold in German and Austrian Merger Control Submitted for Public Consultation, May 14, 2018, available at https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2018/14\_05\_2018\_TAW.html. 134 Section 39a of the German Draft Bill. 135 See Merger Enforcement Improvement Act, S.306 (116th Congress). 136 See J. Baker et al., Five Principles for Vertical Merger Enforcement Policy, ANTITRUST, Summer 2019. 45 information and management systems. These systems provided information that salvage yards use to take inventory of, buy, and sell parts. These systems included the ability of salvage yards to search a central database that pools inventory of subscribing yards. Most importantly, the information from this system could be collected and later sold.137 However, the FTC’s successful lawsuit against ADP, which resulted in a fine of $2.97 million, was not based on allegations of anticompetitive behavior. It was based on a violation of the HSR Act, which requires merging companies to submit, under item 4(c) of the HSR form, any documents they produced while assessing the benefits of the transaction. ADP did not file any 4(c) documents, even though the court later discovered that ADP did possess documents that it should have provided, including some that substantiated accusations the firm had behaved anticompetitively. DoubleClick/Abacus (1999) In the early days of the internet, many favored the development of online advertising models that could protect privacy. DoubleClick’s business model did not rely on the collection of personal information. In 1999, DoubleClick proposed to acquire Abacus, the largest catalog database firm in the United States Abacus collected detailed information about consumers’ offline purchases. At the end of 1998, the Abacus database contained over 88 million detailed buyer profiles compiled from records of over 2 billion catalog purchasing transactions. In its investigation, the FTC analyzed whether DoubleClick used “personal identifying information” from Abacus’ database to create user profiles for target advertising.138 The FTC, after eleven months of investigation, cleared DoubleClick of allegations it had invaded consumers’ privacy, arguing that DoubleClick never used or disclosed consumers’ personal identifying information for purposes other than those disclosed in its privacy policy. PayPal/eBay (2002) Data-related efficiencies was a key point in the DOJ’s clearance of eBay’s acquisition of PayPal. The merging companies both provided person-to-person payment systems used to complete transactions in connection with eBay auctions. Investigation concerns included eBay’s ability to control the use of PayPal on other sites. However, the DOJ concluded that the integration of the two companies “would make transactions more convenient for eBay 137 Press Release, Fed. Trade Comm’n, FTC Challenges ADP/Autoinfo Merger, Nov. 14, 1996, available at https://www.ftc.gov/news-events/press-releases/1996/11/ftc-challenges-adpautoinfo-merger. 138 Letter from Joel Winston, Acting Associate Director, Fed. Trade Comm’n, to Christine Varney, Esq., Hogan & Hartson, Jan. 21, 2001. 46 buyers and also improve the detection of fraud by combining the information that had been separately amassed by the two companies.”139 Google/DoubleClick (2007) Google already dominated search advertising, and both companies competed for online display advertising, although they concentrated on slightly different parts of the market. Both also held vast amounts of data. Opponents of the merger argued that the combination of this data raised privacy concerns and would give Google’s relevant ad intermediation product, AdSense, a competitive advantage over advertising rivals. In its investigation, the FTC analyzed relevant online advertising markets and found that all online advertising does not constitute a relevant antitrust market. This is because advertisers purchase different types of inventory for different purposes. Furthermore, AdSense was a leading provider of contextual advertising, and DoubleClick neither provided contextual advertising nor acted as an intermediary.140 On the other hand, the dissenting statement highlighted DoubleClick’s recent reentry into the intermediation market. In the end, the FTC voted 4–1 to close its investigation of Google’s proposed acquisition of DoubleClick after a thorough examination of the evidence bearing on the transaction. One of the arguments was that the evidence indicates that neither the data available to Google, nor the data available to DoubleClick, constitutes an essential input to a successful online advertising product. Reed Elsevier/ChoicePoint (2008) In 2008, the FTC challenged the $4.1 billion acquisition of ChoicePoint, a data aggregation company, by Reed Elsevier, a global provider of various professional information services. Although both companies provided many other products and services, both offered a subscription service to law-enforcement agencies to access public and nonpublic information on individuals and businesses. The FTC found that the merger would stifle competition between these competing offers to law enforcement by bringing them under a single owner, and required ChoicePoint to divest one of its key products, CLEAR, to Thompson Reuters, a competing information-service provider. Without divestiture, Reed Elsevier’s acquisition of 139 U.S. DEP’T OF JUSTICE & FED. TRADE COMM’N, COMMENTARY ON HORIZONTAL MERGER GUIDELINES (Mar. 2006), available at https://www.justice.gov/atr/commentary-horizontal-merger-guidelines. 140 Press Release, Fed. Trade Comm’n, Federal Trade Commission Closes Google/DoubleClick Investigation, Dec. 20, 2007, available at https://www.ftc.gov/news-events/press-releases/2007/12/federal-trade-commissioncloses- googledoubleclick-investigation. 47 ChoicePoint would allegedly give Reed Elsevier control over public and nonpublic information about individuals and businesses, including information regarding credit data, criminal records, motor vehicles, property, and employment records.141 Microsoft/Yahoo! (2008) The DOJ investigated and did not challenge the companies’ agreement to combine their backend search and paid search advertising technology. Combining back-end search and paid search advertising would be more likely to increase competition by creating an alternative to Google. The agency analyzed the relevant harm to and control of data of users of internet search functions, paid search advertisers, internet publishers and distributors of search, and paid search advertising technology.142 The agency concluded that the transaction would “enhance Microsoft’s competitive performance because it will have access to a larger set of [search] queries, which should accelerate the automated learning of Microsoft’s search and paid search algorithms.”143 The transaction would thereby create a more viable competitive alternative to Google. Dun & Bradstreet/Quality Education Data (2010) The FTC objected to the acquisition of QED, a company offering marketing services in the education sector, by MDR, a subsidiary of the business-information provider Dun & Bradstreet. The FTC alleged that the parties “were the only significant U.S. suppliers of [K- 12] educational marketing data,” and the merger would have created a monopoly in this market. The data sold by these companies is used to sell books, educational materials, and other products to teachers and other educators nationwide. Control over this data would allow Dun & Bradstreet power over not only access to data, but a say in how and what products are 141 Press Release, Fed. Trade Comm’n, FTC Challenges Reed Elsevier’s Proposed $4.1 Billion Acquisition of ChoicePoint, Inc., Sept. 16, 2008, available at https://www.ftc.gov/news-events/press-releases/2008/09/ftcchallenges- reed-elseviers-proposed-41-billion-acquisition. 142 Press Release, U.S. Dep’t of Justice, Statement of the Department of Justice Antitrust Division on Its Decision to Close Its Investigation of the Internet Search and Paid Search Advertising Agreement Between Microsoft Corporation and Yahoo! Inc., Feb. 18, 2010, available at https://www.justice.gov/opa/pr/statementdepartment- justice-antitrust-division-its-decision-close-its-investigation-internet. 143 Gregory Luib & Mike Cowie, Big (But Not Bad) Data and Merger Efficiencies, LEXOLOGY, Jan. 28, 2020, available at https://www.lexology.com/library/detail.aspx?g=3712daef-e9df-4584-83c3-ccfe465ea0f4. 48 sold to educators.144 In the final settlement, MDR agreed to divest some assets to MCH Strategic Data, to preserve competition in the market. Costar/LoopNet (2011) Costar, the largest provider of commercial real estate information services in the United States, acquired LoopNet, owner of the most-used commercial real estate information database in the country. The FTC challenged the transaction and required CoStar to sell some of LoopNet’s stake in Xceligent, another provider with a business model closely resembling CoStar’s, and which received data and financial investment from LoopNet. Both CoStar and Xceligent aggregate commercial real estate listings and property-specific information nationwide.145 Google/ITA (2011) The Antitrust Division of the DOJ filed a lawsuit to block Google’s acquisition of ITA Software, producer of QPX. The QPX software conducts searches for air travel fares, schedules, and availability. The DOJ’s complaint alleged that Google’s use of ITA’s software to provide its own price comparison service, which would compete with these firms, would give it the means and the incentive to cut off their access to QPX. The DOJ and Google reached a settlement whereby Google would be allowed to purchase ITA on the condition it licenses QPX to its competitors for five years. The DOJ’s focus was not that the data itself would give Google too much market power, but that access to QPX was excludable. The settlement allowed airfare websites to use this software on commercially reasonable terms.146 Bazaarvoice/PowerReviews (2012) In Bazaarvoice/PowerReviews, Bazaarvoice was the market-leading provider of ratings and review platforms that enable manufacturers and retailers to collect, organize, and display 144 See Press Release, Fed. Trade Comm’n, FTC Challenges Dun & Bradstreet's Purchase of Competing Education Data Provider, May 7, 2010, available at https://www.ftc.gov/news-events/pressreleases/ 2010/05/ftc-challenges-dun-bradstreets-purchase-competing-education-data. 145 Press Release, Fed. Trade Comm’n, FTC Places Conditions on CoStar’s $860 Million Acquisition of LoopNet, Apr. 26, 2012, available at https://www.ftc.gov/news-events/press-releases/2012/04/ftc-places-conditionscostars- 860-million-acquisition-loopnet. 146 Press Release, U.S. Dep’t of Justice, Justice Department Requires Google Inc. to Develop and License Travel Software in Order to Proceed with Its Acquisition of ITA Software Inc., Apr. 8, 2011, available at https://www.justice.gov/opa/pr/justice-department-requires-google-inc-develop-and-license-travel-softwareorder- proceed-its. 49 consumer-generated product reviews and ratings. Bazaarvoice and PowerReviews were the two largest providers of ratings and review platforms in this space. In 2013, the DOJ filed a lawsuit seeking to restore the competition that was extinguished by the transaction. The agreed-upon remedy required Bazaarvoice to sell all of the PowerReviews assets to a divestiture buyer, among other things, to allow for the divestiture buyer to quickly achieve the competitive position that PowerReviews would have occupied.147 Nielsen Holdings/Arbitron (2013) The FTC sued Nielsen, an audience-measurement company, because it feared Nielsen’s acquisition of Arbitron, a provider of cross-platform ratings services, would allow Nielson to become a nationwide monopoly provider of cross-platform audience-ratings services, a market that does not exist in the United States, but which Nielsen and Arbitron would have been positioned to develop. Nielsen was a leading provider in global media measurement and research services, and provides television, online, mobile, and cross platform audience measuring services to media companies. Arbitron was also a media measurement and research firm that provides radio rating services. The FTC alleged that combining both platforms to create a cross-platform rating service would have caused an uneven playing- field in the ability to provide this data to media companies.148 Google/Nest Labs (2014) In 2014 Google announced that it would pay $3.2 billion in cash to purchase Nest Labs Inc. Nest Labs is the manufacturer of a home thermostat that links to the internet. Unlike its predecessors, Nest’s device monitors residents’ behavioral patterns, including temperature preferences and comings and goings to optimize heating and cooling over the day. The company later introduced a smoke and carbon monoxide detector and a security camera that also collect data. At the time of the merger, privacy advocates worried that the merger would give Google intimate insight into the private offline behavior of Nest customers, giving it an unprecedented ability to target them for advertising. The FTC disagreed, quickly deciding not 147 Press Release, U.S. Dep’t of Justice, Justice Department and Bazaarvoice Inc. Agree on Remedy to Address Bazaarvoice’s Illegal Acquisition of PowerReviews, Apr. 24, 2014, available at https://www.justice.gov/opa/pr/justice-department-and-bazaarvoice-inc-agree-remedy-address-bazaarvoice-sillegal- acquisition. 148 Press Release, Fed. Trade Comm’n, FTC Puts Conditions on Nielsen’s Proposed $1.26 Billion Acquisition of Arbitron, Sept. 20, 2013, available at https://www.ftc.gov/news-events/press-releases/2013/09/ftc-putsconditions- nielsens-proposed-126-billion-acquisition. 50 to challenge the merger. Nest Labs promised not to share its data with Google without users’ permission.149 CoreLogic/DataQuick (2014) The FTC intervened in CoreLogic’s acquisition of DataQuick. Both CoreLogic and DataQuick were providers of property information and analytics to the real estate, mortgage lending, and secondary investor markets in the United States They were also two of the only three providers of national assessor and recorder bulk data. Although much of the data in question is generated regionally by many different companies, the FTC argued that the merger would have created a monopoly on national data because simply aggregating the available regional data did not provide national coverage. CoreLogic agreed to license some of its national bulk data to Renwood RealtyTrac, a competitor, in order to strengthen that firm and improve competition in this field. The shift in license to RealtyTrac halts DataQuick’s opportunity to control a majority of national assessor and recorder bulk data as well as several other ancillary data sets.150 The competition issue at the heart of this case was not the amount of data the companies held, but the reduced competition in the market to sell this information that would have occurred through the proposed merger. Therefore, the FTC cleared the transaction with a database divestiture. Facebook/WhatsApp (2014) Facebook uses the data generated by its network to offer better services to both users and advertisers. WhatsApp was a rival cross-platform messaging service that was rapidly gaining new users. Unlike Facebook, WhatsApp did not sell advertising space nor collect large amounts of personal data on its users. Instead it charged some users a small fee. When Facebook proposed to acquire WhatsApp in 2014, many privacy advocates worried that the merger would eliminate a main challenger to Facebook and reduce options for users who valued privacy. The FTC approved Facebook’s $19 billion dollar acquisition WhatsApp, stressing that WhatsApp must honor its commitment to maintain its pre-Facebook privacy practices. These policies include refraining from collecting names, emails addresses, or other 149 Rolfe Winkler & Alistair Barr, Nest to Share User Information with Google for the First Time, WALL ST. J., June 24, 2014, available at https://blogs.wsj.com/digits/2014/06/24/nest-to-share-user-information-with-google-forfirst- time/. 150 Press Release, Fed. Trade Comm’n, FTC Puts Conditions on CoreLogic, Inc.’s Proposed Acquisition of DataQuick Information Systems, Mar. 24, 2014, available at https://www.ftc.gov/news-events/pressreleases/ 2014/03/ftc-puts-conditions-corelogic-incs-proposed-acquisition-dataquick. 51 information from its users’ mobile address book or contact lists other than mobile phone numbers. Without this agreement, Facebook would have had access to hundreds of millions of more user profiles that it could sell or share otherwise.151 Microsoft/LinkedIn (2016) The investigation addressed data access and innovation of LinkedIn data that could, in theory, be used with Microsoft’s machine learning capabilities to improve lead generation capabilities of Microsoft’s Dynamics customer relationship management (CRM) software. The FTC found that the merged entity would not have the ability to foreclose competing providers of CRM software solutions if it reduced access to LinkedIn full data because it would be unlikely to negatively affect the overall availability of substitutable data required for machine learning in CRM software solutions. Therefore, the FTC cleared the transaction.152 CVS Health/Aetna (2018) U.S. District Judge Richard Leon, before approving the settlement that allowed the merger, explained that it offered substantial efficiencies, including efficiencies driven by data integration. One of the major problems plaguing the U.S. healthcare system is that information is siloed. For example, physicians and hospitals may lack access to pharmacy claims data. Pharmacies may lack access to medical records. These inefficiencies can harm patients and lead to higher-cost, lower-quality care. Both CVS Health and Aetna have a significant share of the market in the sale of Medicare Part D prescription drug plans. Although inefficiencies from information silos could be solved by this merger, it could lead to anticompetitive practices in the control of these subsets of data of millions of healthcare members nationwide.153

C. Multi-firm conduct

Government and non-government litigants often challenge collusive behavior by competitors as a violation of competition laws. As technology advances and the cost of storing and analyzing data decreases, companies are turning increasingly to computer-driven algorithms in order to optimize business decisions. This raises the question of how those algorithms intersect with traditional prohibitions on conspiracy and collusion. While the applications of algorithmic decision-making are broad, the focus of this section will be on the use of computer-driven algorithms for the purpose of pricing goods. In a typical case, a company collects real-time pricing data, including competitor pricing data, and utilizes an algorithm to process the information and respond in real time to changes in market conditions. While this practice may have certain procompetitive benefits, antitrust regulators and private (i.e., non-government) litigants have challenged firms that have allegedly used pricing algorithms in anticompetitive, collusive ways. The sections below discuss three forms of algorithm-driven collusion that have drawn criticism from regulators in the United States and abroad: (1) explicit, (2) hub and spoke, and (3) tacit. 1. Explicit collusion When parties agree explicitly to collude and maintain an anticompetitive policy, typically agreeing on price or supply, it is a direct and intentional antitrust violation. The algorithms that help increase market efficiency and provide procompetitive benefits can also be used to enforce the collusive agreement by quick detection of any deviation from the agreed terms and programmatic retaliation. For example, an algorithm that allows a supplier to monitor its competitors’ prices and react competitively to price drops can also be used as an enforcement device to detect defections and quickly retaliate. The programmatic nature of the enforcement mechanism increases the agreement’s stability.154 The market structure, demand factors, and supply factors will have an impact on the likelihood of an explicit collusion enforced with algorithms. Specifically, market transparency and the frequency of transactions increase the likelihood of a collusion since the algorithms can detect a defection and suppliers can react. In contrast, a market characterized with constant innovation will decrease the likelihood of a collusive agreement since it reduces the present value of the collusion (the product is constantly changing) and reduces the ability of the less innovative firms to retaliate. Similarly, a market characterized by a large degree of product or service differentiation between suppliers will decrease the likelihood of a collusion since deviations might be harder to detect and the value of collusion could vary substantially between the parties due to their product differences.155 Collusions are typically not stable in markets characterized with large demand or supply fluctuations or other factors that require frequent price or supply adjustments since they would require multiple agreement changes, meetings, or other communications.156 The main differentiator between algorithmic collusion, per-se antitrust violation, and other potentially lawful algorithm-based conduct examples discussed below is the presence of an agreement between parties to collude, whether in oral or written form. While proven communications or whistleblowers are not required for the court to find parties engaged in a collusive agreement,157 it is the main vehicle for law enforcements to prove the presence of the collusion For most cases, analysis of the code allegedly used to enforce the collusion is not sufficient to prove unlawful conduct since, as mentioned before, the same algorithms can be used for both lawful and unlawful purposes. In the United States, the DOJ has successfully prosecuted cases of overt, algorithmic driven collusion. For example, in July 2015, an e-commerce seller in the United States was charged with, and pled guilty to, conspiring to fix the prices of posters sold through Amazon Marketplace. According to the charge by the DOJ, “[t]o implement their agreements, the defendant and his coconspirators adopted specific pricing algorithms for the sale of certain posters with the goal of coordinating changes to their respective prices and wrote computer code that instructed algorithmbased software to set prices in conformity with this agreement.”158 Three-and-a-half years later, in January 2019, the DOJ (with the assistance of the FBI) concluded its investigation and prosecution of the online wall décor industry with the conviction of another co-conspirator.159 This case is considered the first case targeting e-commerce and a proven conspiracy implemented with the use of algorithms. Outside the United States Greece’s antitrust regulator, the Hellenic Competition Commission, fined retailer Carrefour Marinopoulos €12.5 million in 2010 for “resale price maintenance,” requiring its franchisees to follow recommended sales prices. It was alleged that Carrefour’s IT system enabled the franchisor to monitor any deviations from the recommended sales price by franchisees and made individual price management difficult and time-consuming, effectively enabling Carrefour to enforce a collusive price across its franchise.160 Similar to the Carrefour case, regulators in the EU prohibit (or allow at a narrow extent) the use of most-favored nation (MFN) clauses by online platforms, arguing that such clauses dampen price competition across sale channels.161 MFN clauses imposed by online marketplace platforms such as Amazon, Booking.com, and Expedia require the vendors to refrain from offering their products or services at lower prices by other distribution channels. While MFN clauses are not generally prohibited in the United States, regulators have expressed concerns when they are present in agreements governing online platforms, and the party imposing the MFN utilizes algorithms to detect defections and enforce penalties over violations.162 Such growing concerns led Amazon in early 2019 to abandon its “Price Parity” policy, which prohibited third-party sellers on its platform in the United States from selling the same products at a lower price elsewhere online.163 Amazon ended the “Price Parity” policy for its platform in Europe in 2013 after regulatory agencies in the U.K. and Germany investigated Amazon over the same policy.164 Investigations and enforcement actions involving explicit collusions enforced by algorithms are rare, either because parties are less likely to enter agreements that are per-se illegal or because the required evidence to prove the conspiracy is high. The next discussed theory of collusion, hub and spoke, is much more present in current investigations and decisions. 2. Hub-and-spoke collusion The “hub-and spoke conspiracy” is one “in which an entity at one level of the market structure, the ‘hub,’ coordinates an agreement among competitors at a different level, the ‘spokes.’”165 “These arrangements consist of both vertical agreements between the hub and each spoke and a horizontal agreement among the spokes ‘to adhere to the [hub’s] terms,’ often because the spokes ‘would not have gone along with [the vertical agreements] except on the understanding that the other [spokes] were agreeing to the same thing.’”166 In hub-and-spoke conspiracies involving pricing algorithms, the “hub” serves as the party sending the pricing signal, and the “spokes” are the parties that receive the signal. Upon receiving these signals, the spokes can set their prices, and coordinate directly through a hub. Antitrust regulators have been active in bringing enforcement actions involving hub-andspoke conspi**r**acies and pricing algorithms. There are issues, however, that have challenged regulators seeking to identify such conspiracies in the first instance. The technology relied upon to implement such conspiracies obviates the need for frequent communications between coconspirators, thereby making it more difficult for regulators to obtain communications that evidence the illegal agreement. On the other hand, the internet has increased pricing transparency, making it easier for the hub to detect and penalize non-compliant members of the conspiracy. Evidence of retaliation—“penalty evidence”—has proven to be of significant evidentiary value in successful investigations and enforcement actions. The first enforcement action involving a hub-and-spoke theory of algorithmic price coordination began in 1992, when the DOJ filed a complaint against eight airlines and the Airline Tariff Publishing Company (ATPCO). Among other things, the DOJ’s complaint alleged that the airlines used the ATPCO, a jointly-owned company, to facilitate the hub-and-spoke conspiracy. Specifically, the airlines used the ATPCO’s online fare dissemination service to communicate with one another, thereby facilitating their horizontal agreement to increase price, eliminate discounts, and set fare restrictions. The DOJ resolved the charges by consent decree, and the U.S. District Court for the District of Columbia approved the settlement in December 1993.167 Outside the United States, regulators have been active in putting an end to similar forms of coordination. For example, in 2016, Russia’s competition agency began an investigation surrounding allegations of price fixing among retail sellers of Apple smartphones.168 The investigation concluded that “since the start of official sales of the Apple iPhone 5s, iPhone 5c, iPhone 6, iPhone 6 Plus, iPhone 6s and iPhone 6s Plus in Russia, most resellers fixed and maintained the same prices for these products during nearly three months.” The investigation also found that the retailers’ prices “coincided with prices from press releases and price lists published and distributed by LLC ‘Apple Rus’ employees from e-mail addresses in the apple.com domain.” The investigation concluded in 2017, after which iPhone prices “significantly decreased” and LLC Apple Rus was forced to pay a fine. The hub-and-spoke conspiracy was enforced by LLC Apple Rus aggressively. After issuing price lists to the retail “spokes” of the conspiracy, LLC Apple Rus utilized price monitoring software to detect and penalize non-compliance. Participating retailers, too, used price-monitoring software to collect competitor-pricing data. Retailers would then use this data to inform LLC Apple Rus about pricing deviations, expecting that the company would take action against defecting retailers.169 As these cases illustrate, sellers may find themselves liable for their involvement in huband- spoke conspiracies when they use third parties to make algorithmically-driven pricing decisions. One case that has not been addressed definitively by courts is whether hub-and-spoke liability might attach to popular ride-sharing companies like Uber and Lyft, which provide car owners with an application platform that they can use to connect with individuals seeking rides. For their service, Uber drivers charge the ride-hailing individuals a fare that is determined by Uber’s pricing algorithm. Uber drivers are not allowed to negotiate individually with riders. In private litigation in the United States, a federal district court found that a plaintiff had “plausibly alleged a [hub-and-spoke] conspiracy in which drivers sign up for Uber precisely on the understanding that the other [drivers] were agreeing to the same pricing algorithm, and in which drivers’ agreements with Uber would be against their own interests were they acting independently.”170 While no competition agency has yet addressed whether this arrangement gives rise to hub-and-spoke liability, the Court of Justice of the European Union (CJEU) has expressed concern that Uber’s business model “might give rise to hub-and-spoke conspiracy concerns when the power of the platform increases[.]”171 Whether Uber’s ride-sharing platform becomes so dominant may determine whether competition authorities challenge Uber’s pricing practices under a hub-and-spoke theory of liability.

3. Tacit collusion There are two types of algorithmic tacit collusion. The first is where firms in the market unilaterally develop algorithms targeted to profit maximize, and at some market setting these algorithms deploy pricing or supply policies that are supra-competitive without any agreement between competitors. These algorithms increase price transparency, reduce the reaction time to price changes, and eliminate human biases in price setting, potentially resulting in supracompetitive pricing.172 The second is machine-learning algorithms that learn to collude although they have not been specifically instructed to do so.173 Prevailing law in the United States does not deem tacit collusion unlawful. Conventional law and economics theory posits that such supra-competitive pricing resulting from tacit collusion is not problematic because it is likely to be unstable and shorter lived than if it were achieved through joint conduct.174 However, others argue that such conduct can be more stable than formal human-based agreements and that companies must take responsibility for anticompetitive behavior deployed by their algorithms, even when they did not intend to collude.175

There are few, if any, actions that have resulted in antitrust liability based on the two types of algorithmic collusion discussed above. However, in Eturas, the CJEU provided guidance as to the circumstances under which the unilateral adoption of a pricing algorithm may give rise to liability. The case involved travel agencies that adopted the same online-booking platform, Eturas, to facilitate travel bookings.176 After adopting the platform, an Eturas administrator sent an email in 2009 to a limited number of the travel agencies, which included a voting option to limit the discount cap for certain services offered by the agencies.177 Two days later, the Eturas administrator circulated another email informing its recipients that the discount cap had been approved.178 Eturas then implemented the discount cap on its platform, and it applied the cap to all participating agencies. The discount cap, however, was not fixed, but if a travel agency sought to provide a customer with a discount in excess of the cap, it would have to take additional steps to do so.179 The Lithuanian Competition Council imposed fines on Eturas and thirty travel agencies that used its platform.180 The case was ultimately appealed to the CJEU, which was tasked with addressing, among other things, the factors that should be considered in determining whether the travel agencies engaged in illegal collusion.181 The CJEU focused on the travel agencies’ knowledge of the administrator’s messages about the discount caps.182 If they had knowledge, courts could presume that the travel agencies colluded among themselves and with Eturas, unless they took actions to distance themselves from the agreement.183 The court held that the presumption could be rebutted in a number of ways.184 For example, by voting against the discount cap, reporting the conduct to the authorities, or consistently offering discounts in excess of the cap.185 Experimental evidence suggests that in certain market settings, such as a small number of sellers and frequent transactions (“repeated games”), it is theoretically possible that machinelearning algorithms will learn to collude, without communicating, and without being programmed to do so.186 However, the Antitrust Division of the DOJ and the FTC expressed the view that “these scenarios seem[ed] too speculative.”187 These concerns may be driven by doubts as to whether machine-learning algorithms can sustain collusion without additional support from humans.188 Having said that, if such collusion arises, companies can be held responsible for the algorithms they deploy, and the anticompetitive outcome created by their algorithm.189 However, machine programs, such as pricing algorithms, will only become an antitrust issue if they are used as instruments of collusion or conspiracy; independent adoption of such pricing algorithms by itself is likely beyond the reach of the antitrust laws. Although doubts remain, the theoretical possibility of collusion should not be dismissed. In a February 2020 report issued by the Antitrust Section of the American Bar Association, the Section noted that the “effects of pricing algorithms on consciously parallel pricing” may warrant more attention in light of advances in technology, and recommended that regulators “continue to evaluate such effects closely in order to determine when they may require further scrutiny under existing competition laws.”190 D. International reports and proposals Numerous governments, competition authorities, special commissions, and international organizations have examined competition and antitrust issues arising from big data and artificial intelligence in recent years. Following a joint study of France’s Autorité de la concurrence and Germany’s Bundeskartellamt in 2016191 and of the OECD also in 2016,192 as well as a study by Japan’s Fair Trade Commission in 2017,193 government competition authorities and commissions issued a number of studies in 2018 and 2019: • the EC’s report on “Competition policy for the digital era” (also known as the Crémer Report);194 • the U.K. Competition and Markets Authority (CMA)’s Digital Expert Panel report on “Unlocking digital competition” (commonly known as the Furman Report);195 • the Australian Competition & Consumer Commission (ACCC)’s “Digital Platforms Report”196 (which complements a 2017 Australian Productivity Commission report on “Data Availability and Use”);197 • the German Commission’s “Competition Law 4.0” report;198 • the Competition Bureau of Canada’s report on “Big data and innovation” (reinforced by the 2019 Competition Policy Council Communique);199 and • the G7 competition authorities’ “Common Understanding” on “Competition and the Digital Economy.”200 In addition, in the United States, the FTC has conducted hearings (including international hearings) to examine the competition, consumer protection, and data privacy implications of new technologies and business practices, including those associated with digital platforms.201 The Stigler Center of the University of Chicago also issued a “Study of Digital Platforms.”202 These studies broadly opine on the dynamics of competition in digital markets, including multi-sided platforms and zero pricing, as described above. Several of these reports have explored whether competition law has been under-enforced. The Furman and Crémer Reports assert that the risk of under-enforcement (wrongly permitting anticompetitive behavior) has not been given sufficient weight against the risk of overenforcement (wrongly prohibiting procompetitive behavior, which could stifle innovation and efficiencies). The concern is that firms that successfully compete for the market enjoy market power that is more durable and less contestable than has been the case in other markets in the past. Other reports such as the Competition Bureau of Canada Report and the Canadian Competition Council Communique suggest that Canada’s competition law continues to provide an appropriate framework for potential anticompetitive behavior in the digital economy. The Competition Canada Report identified the need to adapt its tools and methods to this evolving area, while its antitrust investigations and analysis will continue to use its traditional framework for market definition, market power, and competitive effects. Common themes that have emerged in some reports include greater responsibilities (whether under ex-ante regulation or ex-post application of competition law) for firms that are dominant or have a particularly strategic role, increasing scrutiny over mergers in the digital sector, and changing presumptions in both merger and dominance cases. Some approaches—particularly where regulation is proposed—introduce institutional reform proposals to house regulatory powers in newly established agencies. Improving international cooperation has also been recognized as important. There is significant consensus on the view that data-driven innovation is more crucial than ever. Also, competition may sometimes depend on some form of access to data. In addition to competition interventions, concern about barriers to entry arising from a dominant firm’s control over data has led to proposals of data portability, interoperability, and open data.203 However, the various studies have differed in their view of how to approach such issues, not only in terms of these specific remedies, but also what body of law—competition law or ex-ante regulation— should give rise to such remedies.

The studies mentioned above range in their level of detail. Those with the most developed thinking and proposals for reform include the Crémer Report, the U.K. Furman Report, and the ACCC Digital Platforms Report, and so these receive the greatest attention. In early 2020, following the German Competition 4.0 report, Germany published its first legislative proposal in the “Digitalization Act” (the “German Draft Bill”), which addresses data access and portability, cross-market leveraging, and intermediation power. Other European countries have expressed support and are likely to follow suit.204 Given Germany’s leadership position in toughening the stance towards platforms (demonstrated, for example, by the Bundeskartellamt’s Facebook Decision205), the German Draft Bill is also discussed below. The sections that follow outline some of the key areas discussed in these reports, focusing first on the line between competition enforcement and regulation in the case of dominance, and then considering merger control. The discussion then turns to multi-firm conduct, particularly algorithms and competition law. It closes by discussing institutional proposals to develop new regulatory units or bodies, and procedural proposals to accelerate enforcement and streamline review of agency decisions. 1. Proposed frameworks for monopolization / abuse of dominance and suggested ex-ante regulation A common concern in the reports was that a firm’s collection and use of data, as well as network effects from platform economies, can result in that firm having significant and entrenched market power. In the case of a dominant platform, it may also effectively act as a regulator of the markets that operate on its platform while also competing in such downstream markets, giving the dominant platform operator power over participants in such markets. As might be expected, views on how to address abuse of dominance claims differed in emphasis on relying on the existing competition framework with some significant adjustments, or whether instead there should be greater emphasis on ex-ante regulation. The two broad areas of focus were, first, the presumption against anticompetitive conduct of dominant firms in competition law, and second, whether (and if so what kind of) ex-ante regulation might be necessary to address dominance problems. 2. Expanding abuse of dominance in the EU and Germany The Crémer Report suggested applying a duty on dominant platforms to ensure that their rules do not impede free, undistorted, and vigorous competition (such as impeding customers from switching to competing platforms, or multi-homing) without an objective efficiency justification. It focused on what can be achieved using existing legal provisions and powers while recognizing that it may be necessary to introduce complementary regulation. It sought a more vigorous approach to vertical theories of harm in order to assess how firms leverage their market power and self-preferencing in downstream product markets operating over their platforms. The Crémer Report also suggested that competition analysis focus less on market definition in digital platforms, and more on the impact of conduct on markets. Focusing on competition law rather than ex-ante regulation, the Crémer Report explored whether a fresh notion of “indispensable data” under a revised approach to the doctrine of “essential facility” under the competition law of dominance might be useful.206 It concluded that refusal to meet standardized requests for data might be viewed as abuse of dominance under Article 102 TFEU207 if the refusal of access is a way for the data gatekeeper to shield itself from competition. The Crémer Report recognized that, for ongoing data access, it would likely be necessary to have sector-specific regulation. It proposed that data portability requirements should be applied to dominant firms where there are substantial consumer lock-in effects in order to strengthen competition in secondary markets. However, these requirements could to some extent be applied under the GDPR, the recently introduced EU data protection framework.208 These findings echoed aspects of the Australian Productivity Commission, which found that introducing open data would be so specific to the type of data, its use, and the APIs and standards involved, that it could only be done on a sector-by-sector basis.209 The ACCC is responsible for leading the introduction of a new “Consumer Data Right.” The government decided that it would start with open banking, then turn to open data in the telecommunications and energy sectors.210 In 2018, the U.K.’s CMA introduced open banking, an initiative to enforce standardized interfaces that enable third parties to access a consumer’s bank data given their permission.211 The Crémer Report also proposed to reverse the burden of proof for anticompetitive conduct by dominant platforms, making it their responsibility to justify certain conduct with compensating efficiencies. To address network effect concerns, the Crémer Report suggested that dominant platforms should have to provide justification if they do not make their platform interoperable with their competitors. It also considered whether remedies for abuse of dominance might include a restorative element. The German Draft Bill reflects several of the Crémer Report’s elements. It builds on 2017 amendments to the competition law which established that zero-pricing of services should not preclude definition of a relevant market for these services, and identified network effects, singleand multi-homing, and access to data and innovation as factors relevant in determining dominance in multi-sided platform markets.212 The German Draft Bill provides that when considering market power of an intermediary in multi-sided markets, particular attention should be given to the importance of its intermediation services for accessing supply and sales markets.213 The German Draft Bill would introduce obligations for “undertakings with paramount importance for competition across markets.”214 Only a very small number of firms would likely have this status, which would be determined based on: • dominance in one or more markets; • financial strength or access to other resources; • vertical integration and activities on otherwise related markets; • access to data relevant for competition; and • the importance of its activities for third parties’ access to supply and sales markets. The German Draft Bill introduces five types of behaviors that the Bundeskartellamt (Federal Cartel Office) can prohibit if it finds a company satisfies this status: • self-favoring;215 • impeding competitors by leveraging market power (even where the provider is not dominant if the impediment is likely to significantly impair the competitive process);216 • using data collected in a market in which it is dominant to create or increase barriers to entry in other markets; • hindering interoperability and data portability if this restrains competition; and • providing insufficient information to other firms to evaluate its services. The prohibition is subject to an efficiency justification. Analogous to the recommendations in the Furman Report, the burden of proof for such justifications would lie on the companies. 3. Inclination towards ex-ante regulation in the U.K. Furman Report and Stigler Center Report The Furman Report was similarly inclined towards proactive intervention by introducing ex-ante regulation, especially for firms with “strategic market status” or SMS, under a new agency—a Digital Markets Unit—focused on digital markets (see below). A subsequent U.K. CMA report217 offered three criteria for SMS in the context of digital advertising: • the presence of enduring market power over a relevant market; • where the platform is a gatekeeper to a significant portion of consumers; and • where businesses depend on the platform to reach the other side of the market (i.e., the platform is not merely a gateway but a bottleneck gateway). The Furman Report’s expansive view of regulation could suggest that the Digital Markets Unit would have objectives relating to data mobility and data openness that would apply across the whole digital sector and not only SMS firms. The proposed new U.K. regulator would focus on level playing-field concern arising from “platform as regulator” issues. Other ex-ante initiatives would include requirements for dominant firms to employ open standards that would permit data portability and interoperability, aimed at reducing the entrenching effects of network externalities. With this ex-ante approach, the Furman Report did not propose to reverse the presumption against anticompetitive conduct in the manner of the Crémer Report, preferring to keep the current competition law approach. It would instead rely more on regulation than competition law as the mechanism to address the dominance concerns, as well as broader sector issues. Some have taken the view that both adjustments to the competition framework and ex-ante regulation are required. For example, the Stigler Center Report proposed reversing or at least relaxing the burden of proof for anticompetitive conduct by platforms with “bottleneck power.” These are conceived similarly to the Furman Report’s SMS and some scenarios of the German “companies with paramount importance for competition,” that is, where the platform has market power and acts as a gatekeeper that controls access to one or more sides of a multi-sided market. The Stigler Center Report envisaged greater focus on such bottleneck platforms, including in relation to refusal to deal, predatory pricing, loyalty rebates, and exclusive dealing.218 It also proposed more proactive intervention through ex-ante regulation for bottleneck firms by a new “Digital Authority.” The Stigler Center envisioned the Digital Authority having regulatory powers over all digital firms over data mobility and open standards, and then mandating data sharing only for firms with bottleneck power.

4. The potential and limits of competition law Although there is some disagreement as to how data privacy intersects with competition law, there has been significant consensus around the need to avoid using competition law to solve all problems in digital markets, such as privacy, and the reports, as described above, have calls for regulation and consumer protection. In addition, in jurisdictions where the abuse of dominance offence includes the imposition of exploitative business terms, enforcers may recognize that competition includes privacy terms, alongside the charging of excessive prices. For example, the German Bundeskartellamt found in February 2019 that Facebook’s aggregation of personal data from Facebook and Facebook-owned sites (such as Instagram) and from third-party websites with the “Like” or “Share” buttons amounted to an abuse of market power. Instead of viewing this as the domain of the newly introduced GDPR, the Bundeskartellamt found that the collection of such personal data without adequate consent amounted to exploitative business terms and an abuse of market power. The Bundeskartellamt’s decision has caused much controversy both by commentators and from German courts. 5. Issues and proposed frameworks for mergers and acquisitions The reports note common concerns about mergers in digital markets related to the risk that an incumbent firm acquires new or potential future rivals. The pricing models of multi-sided markets, particularly “free” services, and ramp up to monetizing products that first become highly successful before generating much revenues, means that many mergers that might raise significant competition issues do not exceed merger notification thresholds that are set according to revenue. Some governments and academics have proposed substantive changes to merger laws with respect to digital markets, and many commentators oppose such efforts to change the standards. See Section III.b, supra. The Crémer Report did not propose to change the revenue-based thresholds that trigger a notification of a merger to the EC at this time, but to keep them under review. Nor did it propose to change the substantive “significant impediment to effective competition” test for mergers. However, it did propose a “heightened degree of control” where an acquisition is plausibly part of a defensive entrenchment strategy. This would include considering the potential future horizontal impact of acquisitions by a dominant platform that may enhance its attractiveness as an ecosystem.219 The Crémer Report did not suggest increasing merger review focus on “potential competition,” and was more concerned about the possibility of a merger strengthening dominance in the ecosystem.220 Similar to its approach to dominance, it suggested shifting the burden of proof to merging parties. The U.K. Furman Report suggested moving to a “balance of harms” test (about which the U.K.’s CMA subsequently expressed reservations), and toning down the presumption that nonhorizontal mergers tend to be benign. It encouraged prioritizing the review of digital mergers, and putting greater weight on “potential competition.” It also proposed introducing a merger notification requirement for firms having “strategic market status” in order to make the CMA aware of all mergers, but not introducing a pre-clearance requirement. It did not, however, propose changing U.K. rules for applying jurisdiction to digital mergers, but to keep under review. It found that the reason why several high-value non-horizontal digital mergers had not been reviewed was not due to gaps in merger notification thresholds: the CMA could have required notification on the basis of a share of supply test. The report did suggest, however, that the CMA must make digital mergers a higher priority.221 Several of these proposals were echoed in the Stigler Center Report,222 although it went further to suggest that platform businesses with bottleneck power should have to notify every acquisition and, thus, would have to wait for pre-clearance independently of their size. The Australian Digital Platforms Report proposed a merger notification protocol for certain transactions (including using a transaction value threshold) of “large platform firms,” and to consider innovation, potential competition, and assets (data in particular) as factors in merger assessments. 6. Issues and proposed frameworks for multi-firm conduct While most of the antitrust concerns around digital markets focus on unilateral conduct and the area of merger control, the reports mentioned above have also expressed—somewhat unrelated—concerns with respect to multilateral conduct. These relate to the implications of (voluntary) data sharing and pooling among competitors and the competitive effects of the use of algorithms for pricing and other business decisions. 7. Issues in data sharing Acknowledging the potential efficiencies of data exchange among competitors, the Crémer Report also expresses the concern that data sharing or pooling may limit competition:223 • Data sharing and pooling constitutes an information exchange, which can favor collusion. As a remedy, the exchanged or pooled data can be limited in scope, provided at a higher level of aggregation, or be anonymized.224 • Data sharing and pooling may also align competitors’ costs or product features, thereby limiting competition on price, quality, or innovation.225 The Crémer Report suggests that growing experience with assessing (the net effect of) data sharing and pooling arrangements may at some point allow competition enforcers to take a more general stance on the permissibility of such arrangements (e.g., through a block exemption by the EC).226 8. Issues in algorithmic collusion A recent publication by the OECD and a joint paper by the French and German competition authorities focus on the concern that algorithms may foster explicit or tacit collusion.227 A key question underlying both publications is whether existing competition law and its interpretation are sufficient to capture potential anticompetitive threats from algorithms. These publications build on a relatively new but rapidly growing legal and economic literature on the topic. In line with that literature, the Franco-German paper distinguishes three scenarios in which algorithms may support supra-competitive pricing: • In the first scenario, firms design and use algorithms to implement an explicit agreement to collude. This includes the automated setting of collusive price levels, the monitoring of other cartel members’ price setting, the automatic punishment of deviations, the facilitation of communication, or the obfuscation of collusion.228 As the paper points out, “the involvement of an algorithm in such a scenario does not raise specific competition law issues” due to the existence of an explicit—and thus illegal— agreement.229 Focusing more narrowly on monitoring and retaliation algorithms, the OECD paper further concludes that “this behavior could be prevented using traditional antitrust tools.”230 • A second scenario involves “situations in which a third party provides the same algorithm or somehow coordinated algorithms to competitors.”231 This third party may be a pricing consultant or developer that provides similar advice on or implementations of pricing algorithms to competitors.232 As the paper points out, this scenario is often compared to a classic “hub-and-spoke cartel.” The paper warns that “even a straightforward use of the same pricing algorithm can lead to similar pricing decisions when the algorithm reacts in similar ways to external events, such as changes in input costs or demand.”233 The paper then discusses that antitrust liability may depend on the degree to which the competitors were aware of each other’s use of the same or similar algorithms.234 • The third scenario involves the parallel use of independent pricing algorithms with self-learning capabilities that may develop strategies to support tacit (through the formation of beliefs about competing algorithms’ reactions) or explicit (through some form of communication) collusion among each other without having explicitly been programmed to do so.235 Pointing to a growing economic literature on this topic that provides initial evidence supporting the feasibility of such learning in experimental settings, the paper nevertheless concedes that it remains an open question whether such learning can occur in real market settings.236 Even if so, the paper suggests that the unilateral adoption of such algorithms may have to be qualified as “intelligent adaptations to the market rather than coordination.”237 In addition to this potential legal loophole, the OECD paper adds that this form of collusion “becomes even harder to prevent using traditional antitrust tools” due to the black box nature of the algorithms. Focusing on the legal situation in the EU and its member states, the Franco-German paper does not suggest changes to competition law and enforcement. Instead, it states that “[t]he existing tools seem, at this stage, flexible in their application to cases involving algorithmic behaviour.”238 However, the paper leaves it open whether future developments, particularly in the area of selflearning algorithms, may require reconsidering the reach of competition law.239 The OECD paper similarly suggests that a legislative approach may be necessary to capture the problem of selflearning algorithms through a changed treatment of tacit collusion. Additionally, the paper proposes a role for ex-ante merger control in markets with algorithmic activities by suggesting to extend the analysis of coordinated effects to less concentrated markets and conglomerate mergers.240 9. Institutions and procedures a. New digital institutions As mentioned above, some reviews, such as the Crémer Report, preferred to rethink some elements of competition law than propose new regulation, which does not require establishing new powers or institutions. Others, such as the Furman Report, proposed to introduce new regulation, which provokes the question of where regulatory and enforcement powers would lie. These questions obviously depend on a given jurisdiction’s existing institutional landscape, in particular the remits of existing competition, data protection, information and communication technology, and media authorities. In the U.K.’s case, the Furman Report proposed a new body, the Digital Markets Unit, with appropriate powers to impose solutions and to monitor, investigate, and penalize non-compliance. These solutions could include a code of conduct for SMS firms, sector-based regulations on data mobility and open standards, and openness of data. The unit would not have a mandate over mergers. The Furman Report did not resolve the question of whether this could be achieved under existing agencies. The Furman Report suggested that the Digital Markets Unit could either be housed in the CMA, the communications regulator (Ofcom), or both. The Australian report envisaged a new specialist digital branch within the ACCC applying the current competition framework. The Stigler Center, in the United States, suggested a new Digital Authority with “clear and broad authority” to make regulations with bottleneck power, including in respect of data sharing. It also envisioned regulations for the tech sector more widely, such as relating to data mobility, open standards, interoperability, and data collection. It also saw the authority as having a role in mergers.

b. Accelerating enforcement and streamlining review

The high speed of change in digital markets risks enforcement intervention coming too late to prevent harm to competition. The U.K.’s Furman Report suggested enabling faster enforcement, such as reducing the thresholds for use of interim measures. The EC also subsequently indicated that it will more readily use interim measures.241 Improving the quality and speed of judicial review of agency decisions was the focus of both the Furman Report and the Stigler Center Report. The latter suggested introducing a specialized competition court. In the U.K., which already has the Competition Appeal Tribunal (CAT), the Furman Report proposed reducing the scope of the CAT’s review of antitrust enforcement. Currently, the CAT can reconsider the full merits of the CMA’s decision on legal and economic matters and make any decision the CMA could have made. A more limited role was proposed to allow the CMA an “appropriate margin of appreciation to reach decisions on digital cases that are likely to be particularly complex and may require elements of expert judgement.”242 10. Conclusion: the need for international coordination Although there are varying approaches, some governments and commentators have proposed complementing traditional ex-post application of competition law with specific ex-ante regulation of dominant platforms. For example, some have considered changing presumptions, including introducing presumptions that certain types of behavior of dominant platforms are anticompetitive, requiring the platform to bear the burden of proof to show otherwise. However, others have opposed efforts to recalibrate competition law for digital markets. Further, stricter antitrust treatment of companies in the digital space bears the risk of a patchwork situation with respect to the “rules of the game” that these companies will face around the globe. Indeed, while the proposals share some common themes, they also exhibit substantial differences. For example, several proposals include the designation of special status (alongside special obligations) to companies of strategic importance in a market. However, the criteria for SMS proposed in the U.K. and the obligations that come with it differ from the broader concept of “paramount importance for competition” encoded in the German Draft Bill and the more comprehensive behavioral rules that the Bundeskartellamt would be able to impose on such companies. In addition, even if the legislative frameworks were identical, the regulatory character of some of the new rules would leave room for interpretation to the regulatory bodies, potentially causing different decisions. Therefore, even if not all of the proposals described above will be implemented, there is a potential for considerable differences with respect to the leeway that digital companies will have across jurisdictions.

#### Big platforms stifle entry and are copycat innovators

Newman, Associate Professor, University of Miami School of Law, ‘19

(John, “Antitrust in Digital Markets,” 72 Vand. L. Rev. 1497) /// Anekah

Due in no small part to the entry barriers described above, digital giants cast long shadows. Even the mere presence—and certainly the activities—of an incumbent like Google or Facebook in a given market can hinder entry and stifle innovation. This dynamic may not be entirely unique to, but does appear to be particularly acute in, digital markets. Yet, perhaps because collecting sufficiently rigorous empirical evidence of consumer-welfare harm is difficult in this context,109 it has gone largely overlooked. The evidence gathered to date suggests that the presence of Google or Facebook in a market can hinder innovation in that market. Recent empirical work indicates that after Google vertically integrates into the market for an app that runs on its Android mobile OS, the developers of existing apps in that market reduce their own efforts to continue innovating.110 More broadly, angel and seed investment activity in the United States has declined since 2015, both in terms of overall deal value and (more precipitously) number of deals closed.111 As market concentration continues to rise, in part due to relatively lax antitrust enforcement, start-up rates are declining across all sectors of the economy.112 A particular type of strategic conduct by an incumbent—even if legal—can also disincentivize entry and innovation. Dominant digital firms are in a unique position to clone, or mimic, small startups’ features.113 Over time, such free-riding may dissuade startups from even attempting entry. A hypothetical illustrates the problem. Suppose a new platform, E, enters the social networking space with hopes of attracting users via an attractive, unique feature. If the social networking space were characterized by vigorous competition, E might stand a good chance of success. Even if an existing rival were to mimic E’s feature, E would remain the first mover as to that feature.114 The would-be copycat has no unique strategic advantage to exploit, leaving E free to compete on the merits. But, in the real world, the general social networking space has matured and yielded one dominant player, Facebook, Inc. Copycat strategies are far more likely to be successful when employed by a dominant incumbent with an installed base of over two billion users.115 The saga of Snapchat, a multimedia messaging app, provides a ready example. Noticing the traction Snapchat was gaining among teenage users, Facebook offered to buy it.116 When that attempt failed, Facebook turned instead to mimicking Snapchat’s features.117 Google reportedly offered to buy Snapchat as well,118 then similarly pivoted toward mimicry.119 Multiple analysts credited these tactics with depressing Snapchat’s user growth and share price.120 Emerging empirical evidence suggests this is not an isolated example.121 After surveying dozens of investors and entrepreneurs, one technology reporter concluded that Facebook’s free-riding “is having a profound impact on innovation in Silicon Valley, by creating a strong disincentive for investors and start-ups to put money and effort into creating products Facebook might copy.”122 According to a founder, Amazon casts a similarly long shadow: “People are not getting funded because Amazon might one day compete with them.”123 At a University of Chicago panel discussion, venture capitalist Albert Wenger depicted the shadows around digital giants like Google, Facebook, and Amazon as “Kill Zones,” that is, “areas not worth operating or investing in, since defeat is guaranteed.”124

#### Start-up innovation creates post-pandemic growth–generating a virtuous cycle of innovation and investment that locks in productivity gains.

Manyika ’21 [James; Chair and Director @ McKinsey Global Institute; and Michael Spence; Philip H. Knight Professor and Dean Emeritus @ Stanford University's Graduate School of Business; “A Better Boom: How to Capture the Pandemic's Productivity Potential,” *Foreign Affairs* 100(4), p. 107-117; AS]

Surprising as it may seem, out of the deepest economic crisis since World War II could come a new era of productivity gains and prosperity. Whether that happens will depend largely on the decisions that governments and businesses make as they prepare to exit the pandemic in the coming months. In the short and medium term, the prospects for increased productivity-and prosperity-are encourag2 ing, as the United States and other countries spend heavily on economic recovery and businesses reap the benefits of digitization. But the outlook is less optimistic over the long term, since governments cannot spend indefinitely and consumer and investment spending may not fill the gap. Governments and businesses must therefore seek to create the conditions for sustained productivity growth and prosperity, in particular by facilitating the diffusion of technological and organizational innovations and bolstering consumer demand. Out of a major global crisis could come a major jolt of productivity growth-but only if policymakers and business leaders make the most of this moment. THE PRODUCTIVITY PARADOX The history of productivity growth can be understood as a succession of technological revolutions, from the steam engine to the computer. Each offered the promise of accelerated productivity and economic growth, and each eventually delivered. But there has often been a delay between innovation and adoption, and another between adoption and economic impact. The economist Robert Solow summed up these apparent discrepancies in a 1987 article in The New York Times Book Review, writing, "You can see the computer age everywhere but in the productivity statistics." His formulation became known as "the Solow paradox." But then came the revolution in information and communication technologies between 1995 and 2005, a decade in which the Solow paradox was temporarily resolved. Widespread adoption of these technologies was accompanied by a simultaneous acceleration in productivity, which grew at an annualized rate of 2.5 percent in the United States, a full percentage point faster than the rate between 1970 and 1995. Companies invested heavily in information and communication technologies and reorganized their operations and managerial practices around them. They did so out of the desire to gain a competitive edge, but also because of relatively robust consumer demand for their products. Productivity growth accelerated in several sectors as a result, driving growth in the U.S. economy as a whole. This period was characterized by an unusual combination of large spurts in productivity growth in a few big sectors employing many workers, such as retail and wholesale, and even larger productivity growth in smaller sectors, such as those that produced computers and electronic products. In both bi and small sectors, there was a virtuous cycle of employment growth to meet demand and even faster growth in the value of the output from these sectors. The value of outputs across all sectors of the economy grew by 3.4 percent per year between 1995 and 2005, whereas the total number of hours worked grew by only 0.9 percent per year. But the boom did not last. Between 2005 and 2019, annual productivity growth in the United States fell by more than half, to 1.0 percent. In the aftermath of the 2008 global financial crisis, from 2010 to 2019, it was even lower, at 0.6 percent. Unlike the United States, z European countries had not experienced rapid productivity gains in the 1995-2005 period, but they did experience the postcrisis decline. r Between 2010 and 2019, annual productivity growth fell below one percent in France, Germany, and the United Kingdom. The Solow paradox was back. After a decade of rapid productivity gains, the information technology revolution had reached a point of diminishing returns. But the next wave of technology-the digitization of processes, big data and analytics, cloud computing, the Internet of Things-was not yet ready to fill the gap. Despite early breakthroughs in image recognition and natural language processing, few firms had begun to make use of artificial intelligence technologies, and digitization was proceeding slowly. We estimated, based on a sector-by sector assessment, that in 2015, the United States had reached only 18 percent of its digital potential and Europe had reached only 12 percent. Moreover, a gap had opened up between the firms that were digital leaders and those that were digital laggards-a gap that other researchers found was correlated with a gap in labor productivity. This gap in technology adoption was widening at a time of weak consumer demand for goods and services, in large part due to the aftereffects of the financial crisis. Firms scaled back their investments, and fewer new businesses were created. Making matters worse, the share of income that flowed to top earners and the owners of capital increased, while the share that went to labor decreased, further weakening demand. Across the United States and Europe, the vast majority of sectors experienced declines in productivity growth. Only four percent of all sectors recorded productivity jumps in 2014, compared with an average of 18 percent of sectors that achieved substantial increases in productivity in the previous two decades. Growth in gross value added-a measure of a firm's or a sector's contribution to GDP-declined from 3.4 percent annually between 1995 and 2005 to 1.8 percent between 2005 and 2019. Growth in hours worked remained roughly unchanged, at 0.7 percent, throughout both periods. These two very different periods of economic activity in the United States reveal much about the underpinnings of productivity growth. It stems first and foremost from the widespread adoption of technological innovations, especially general-purpose technologies such as electricity and the Internet. But it also stems from the managerial innovation and reorganization of functions and tasks that occur when firms adopt new technologies. Both of these processes must spur leaps in productivity growth in many sectors, or at least in a few large ones, so that productivity jumps in the economy as a whole. Finally, adoption and reorganization within and across sectors must be driven by competition, which incentivizes firms to innovate and helps spur technological diffusion. Not all productivity growth is created equal, however. Productivity growth can be achieved through gains in the volume or value of outputs for a given number of hours worked, or it can come about as a result of a reduction in hours worked for a given output. Often both happen at the same time. But it is when the former exceeds the latter that a virtuous cycle is created in which innovation and investment generate growth in employment and wages, which in turn generates demand for increased (or more valuable) output. This is what happened during the period from 1995 to 2005. When the latter source of productivity growth exceeds the former, however, a vicious cycle results in which firms reduce labor costs faster than they grow the volume or value of their outputs, which in turn puts pressure on employment and incomes. POST-PANDEMIC POTENTIAL The pandemic has primed advanced economies for another period of rapid productivity growth. It is too early to say for sure whether such growth will be the product of a virtuous or a vicious cycle, but signs point to the former. Despite uncertainty, stress, and plummeting economic activity in the early days of the covID-19 crisis, many firms boldly deployed and used new general-purpose technology-especially digital technology-in ways that have driven virtuous productivity gains in the past. In October 2020, we surveyed 900 C-suite executives in various sectors and countries and found that many had digitized their business activities 20 to 25 times as fast as they had previously thought possible. Often, this meant shifting their businesses to online channels, since roughly 60 percent of the firms we surveyed experienced a significant increase in customer demand for online goods and services as a result of the pandemic. Before the pandemic, e-commerce was forecast to account for less than a quarter of all U.S. retail sales by 2024. But during the first two months of the covID-19 crisis, e-commerce's share of retail sales more than doubled, from 16 percent to 33 percent. And that growth did not just reflect brick-and-mortar firms setting up shop online for the first time. Firms that were already highly digitized before the pandemic significantly expanded their online capabilities to meet the surge in demand. They also reorganized their operations, including their logistics, to complement what they were doing digitally-for example, by expanding their direct-to-home delivery capabilities. Businesses also strove to become more efficient and agile. In Europe and North America, nearly half of the respondents to our survey said that they had reduced their operating expenditure as a share of revenue between December 2019 and December 2020. Two-thirds of senior executives said they had increased investment in automation and artificial intelligence, whether to help warehouse and logistics operations cope with higher e-commerce volumes or to enable manufacturing plants to meet surging demand. Many companies used technology to reduce the physical density of their workplaces or to enable contactless service-for instance, by expanding self-checkout in grocery stores and pharmacies and employing online ordering apps for restaurants and hotels. Other businesses, such as meatpacking and poultry plants, accelerated the deployment of robotics to reduce their need for labor. If there was one lesson from the pandemic, it was that digital capability and resilience go hand in hand. But even as the arrival of vaccines has made it possible to imagine a return to relative normalcy in parts of the developed world, continued digitization and the adoption of other technological innovations promise to deliver still more productivity gains. The largest of these gains-roughly an additional two percentage points per year-could come in the health-care, construction, information technology, retail, pharmaceutical, and banking sectors. In health care, for instance, accelerating the use of telemedicine beyond the pandemic could drive incremental productivity growth for years. According to one recent U.S. poll, 76 percent of patients expressed interest in using telemedicine in the future, and industry experts project that the services for 20 percent of health-care spending could be delivered virtually-up from 11 percent before the pandemic. Other sectors, including automotive, travel, and logistics, show less-but still substantial-potential for productivity growth as a result of more flexible task scheduling, leaner operations, and smarter procurement. Overall, these innovations and organizational changes could accelerate productivity growth by around one percentage point per year between now and 2024 in the United States and the six large European economies that we analyzed (France, Germany, Italy, Spain Sweden, and the United Kingdom). This gain would result in a productivity growth rate twice as high as the rate after the 2008 global financial crisis, and in the United States, it would expand per capita GDP by roughly $3,500 by 2024. That would be a stunning outcome, but it will hinge on continued technology adoption by firms and the maintenance of robust demand. Even more productivity gains could be on the horizon thanks to other advancements. The accelerating revolution in biology, for instance, could transform sectors from health care and agriculture to consumer goods, energy, and materials. Biological innovation has already enabled the rapid development of new vaccines for covID-19. Equally impressive revolutions in energy could make possible the widespread adoption of solar and wind power, especially in light of recent progress toward better (and cheaper) batteries. Artificial intelligence is also advancing rapidly, but is still a long way from being deployed widely across companies and sectors. When and if that happens, the productivity gains could be enormous. FOLLOW THE DIGITAL LEADER Future gains in productivity, even those that boost overall growth, are likely to be uneven. We analyzed metrics that have the potential to unleash future productivity growth-such as research-and-development spending, revenue, capital expenditures (including digital expenses), and mergers and acquisitions-and found that especially in the United States, a small number of large superstar firms accounted for a disproportionately large share of the activity in all these categories. From the third quarter of 2019 to the third quarter of 2020, U.S. superstars (defined as the top ten percent of firms by profit) saw much shallower declines in capital expenditures and revenue than did other companies. During the same period, U.S. superstars spent $2.6 billion more on R & D than they did the previous year, while all other firms spent just $1.4 billion more. If this investment, innovation, and technology adoption gap between superstars and the rest of the large firms and smaller, less profitable firms persists, any post-pandemic acceleration in productivity growth could fall short of its potential. Small and mediumsized enterprises have been hit disproportionately hard by the covID-19 crisis. As a result, many of them are unable to make big investments in future productivity and are therefore liable to fall even further behind the superstars. This is what happened in the aftermath of the 2008 global financial crisis, when only a minority of companies achieved productivity growth. But there is room for cautious optimism about the ability of nonsuperstars to close some of the gap. Before the pandemic, the superstars tended to be highly digitized and innovative in their managerial approaches, as well as more profitable and resilient. They were therefore better placed to weather and even take advantage of the shock. But as the hardest-hit firms and sectors recover, and as early digital adaptors demonstrate the enormous potential of these technologies, many of the digital laggards could begin to catch up. Indeed, in another survey of executives we conducted in December 2020, about 75 percent of respondents in North America and Europe said they expected investment in new technologies to accelerate substantially between 2020 and 2024, up from 55 percent between 2014 and 2019. This expected uptick was similar across firm sizes. Another reason for optimism is that in 2020, a year that saw the darkest economic days of the pandemic, 24 percent more new businesses were created in the United States than in 2019. Europe lagged behind the United States on this metric, with new business creation staying roughly flat in 2020 in France, Germany, and the United Kingdom and declining by more than 15 percent in Italy and Spain. If the American increase in business dynamism persists, however, it should contribute to more productivity growth. Investment, innovation, and technology adoption are only one-half of the virtuous cycle of productivity growth, however. The other half is demand for the expanded output that results-in other words, income growth from increased productivity has to flow to people who will spend that additional money. In the short term, the outlook for demand is good, especially for countries that have made progress toward vaccinating their populations and could be among the first to open up their economies. Pent-up demand and savings from the pandemic could be unleashed all at once, resulting in a strong initial bounce in demand led by consumers. In the United States, President Joe Biden's $1.9 trillion economic support bill should push demand even higher. In the medium term, the outlook for demand is also relatively solid, although it will depend on the size, deployment, and longevity of government spending. In the United States, Biden now has set his sights on a large infrastructure package. As his administration shifts its focus from economic relief to investment in productive areas, it could also increase productivity growth by raising demand to match potential supply, creating a high-pressure economy, that is, one with low unemployment and high growth. The outlook in continental Europe, where large-scale government economic support is harder to coordinate, is less certain. Nonetheless, the EU has put in place an unprecedented plan totaling some $900 billion to boost investment in the digital and green energy transitions. But government spending on this scale will likely be time-limited, making the long-term outlook for demand less rosy. Moreover, long neglected problems, including the falling share of firms' income going to workers, rising inequality, and the long-term decline in private investment, could drag down demand. Roughly 60 percent of the postpandemic productivity gains that we estimate could come from innovations and organizational restructuring-the one percentage point of acceleration per year between now and 2024-would stem from firm-level measures, such as automation, designed to cut labor and other business costs. Unless firms do more to boost the volume or value of their output and help workers transition by acquiring new skills, the drive for efficiency will risk generating productivity gains through a vicious, rather than a virtuous, cycle, undermining wages and jobs and weakening consumption-driven demand and investment. A NEW AGE OF DYNAMISM? What can businesses and governments do to capitalize on the positive short- and medium-term outlook for productivity and to improve the long-term outlook? First, they should work to speed up technology adoption and managerial innovation, helping these changes spread within and across sectors. As the recovery begins, firms that have until recently been focused on crisis management and survival should follow the lead of superstar firms by investing in technology and reorganization. The superstars can assist in this process by supporting their broader ecosystems, in particular by doing business with smaller firms that offer complementary products and services. Governments can support the process, as well, by investing in research and development. Policymakers should also seek to strengthen competition and business dynamism. In a healthy economy, the firms that add the most value prosper and grow, while the firms that add the least value shrink or disappear: so-called creative destruction. Policymakers can revive and reinforce this natural sorting process by revising competition rules, bankruptcy procedures, and product and labor-market regulations.

#### Slow growth causes extinction.

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Four structural forces will shape the future of International Relations: globalization (but without liberal rules, institutions, and leadership)1; multipolarity (the end of American hegemony and wider distribution of power among states and non-states2); the strengthening of distinctive, national and subnational identities, as persistent cultural differences are accentuated by the disruptive effects of Western style globalization (what Samuel Huntington called the “non-westernization of IR”3); and secular economic stagnation, a product of longer term global decline in birth rates combined with aging populations.4 These structural forces do not determine everything. Environmental events, global health challenges, internal political developments, policy mistakes, technology breakthroughs or failures, will intersect with structure to define our future. But these four structural forces will impact the way states behave, in the capacity of great powers to manage their differences, and to act collectively to settle, rather than exploit, the inevitable shocks of the next decade. Some of these structural forces could be managed to promote prosperity and avoid war. Multipolarity (inherently more prone to conflict than other configurations of power, given coordination problems)5 plus globalization can work in a world of prosperity, convergent values, and effective conflict management. The Congress of Vienna system achieved relative peace in Europe over a hundred-year period through informal cooperation among multiple states sharing a fear of populist revolution. It ended decisively in 1914. Contemporary neoliberal institutionalists, such as John Ikenberry, accept multipolarity as our likely future, but are confident that globalization with liberal characteristics can be sustained without American hegemony, arguing that liberal values and practices have been fully accepted by states, global institutions, and private actors as imperative for growth and political legitimacy.6 Divergent values plus multipolarity can work, though at significantly lower levels of economic growth-in an autarchic world of isolated units, a world envisioned by the advocates of decoupling, including the current American president.7 Divergent values plus globalization can be managed by hegemonic power, exemplified by the decade of the 1990s, when the Washington Consensus, imposed by American leverage exerted through the IMF and other U.S. dominated institutions, overrode national differences, but with real costs to those states undergoing “structural adjustment programs,”8 and ultimately at the cost of global growth, as states—especially in Asia—increased their savings to self insure against future financial crises.9 But all four forces operating simultaneously will produce a future of increasing internal polarization and cross border conflict, diminished economic growth and poverty alleviation, weakened global institutions and norms of behavior, and reduced collective capacity to confront emerging challenges of global warming, accelerating technology change, nuclear weapons innovation and proliferation. As in any effective scenario, this future is clearly visible to any keen observer. We have only to abolish wishful thinking and believe our own eyes.10 Secular Stagnation This unbrave new world has been emerging for some time, as US power has declined relative to other states, especially China, global liberalism has failed to deliver on its promises, and totalitarian capitalism has proven effective in leveraging globalization for economic growth and political legitimacy while exploiting technology and the state’s coercive powers to maintain internal political control. But this new era was jumpstarted by the world financial crisis of 2007, which revealed the bankruptcy of unregulated market capitalism, weakened faith in US leadership, exacerbated economic deprivation and inequality around the world, ignited growing populism, and undermined international liberal institutions. The skewed distribution of wealth experienced in most developed countries, politically tolerated in periods of growth, became intolerable as growth rates declined. A combination of aging populations, accelerating technology, and global populism/nationalism promises to make this growth decline very difficult to reverse. What Larry Summers and other international political economists have come to call “secular stagnation” increases the likelihood that illiberal globalization, multipolarity, and rising nationalism will define our future. Summers11 has argued that the world is entering a long period of diminishing economic growth. He suggests that secular stagnation “may be the defining macroeconomic challenge of our times.” Julius Probst, in his recent assessment of Summers’ ideas, explains: …rich countries are ageing as birth rates decline and people live longer. This has pushed down real interest rates because investors think these trends will mean they will make lower returns from investing in future, making them more willing to accept a lower return on government debt as a result. Other factors that make investors similarly pessimistic include rising global inequality and the slowdown in productivity growth… This decline in real interest rates matters because economists believe that to overcome an economic downturn, a central bank must drive down the real interest rate to a certain level to encourage more spending and investment… Because real interest rates are so low, Summers and his supporters believe that the rate required to reach full employment is so far into negative territory that it is effectively impossible. …in the long run, more immigration might be a vital part of curing secular stagnation. Summers also heavily prescribes increased government spending, arguing that it might actually be more prudent than cutting back – especially if the money is spent on infrastructure, education and research and development. Of course, governments in Europe and the US are instead trying to shut their doors to migrants. And austerity policies have taken their toll on infrastructure and public research. This looks set to ensure that the next recession will be particularly nasty when it comes… Unless governments change course radically, we could be in for a sobering period ahead.12 The rise of nationalism/populism is both cause and effect of this economic outlook. Lower growth will make every aspect of the liberal order more difficult to resuscitate post-Trump. Domestic politics will become more polarized and dysfunctional, as competition for diminishing resources intensifies. International collaboration, ad hoc or through institutions, will become politically toxic. Protectionism, in its multiple forms, will make economic recovery from “secular stagnation” a heavy lift, and the liberal hegemonic leadership and strong institutions that limited the damage of previous downturns, will be unavailable. A clear demonstration of this negative feedback loop is the economic damage being inflicted on the world by Trump’s trade war with China, which— despite the so-called phase one agreement—has predictably escalated from negotiating tactic to imbedded reality, with no end in sight. In a world already suffering from inadequate investment, the uncertainties generated by this confrontation will further curb the investments essential for future growth. Another demonstration of the intersection of structural forces is how populist-motivated controls on immigration (always a weakness in the hyper-globalization narrative) deprives developed countries of Summers’ recommended policy response to secular stagnation, which in a more open world would be a win-win for rich and poor countries alike, increasing wage rates and remittance revenues for the developing countries, replenishing the labor supply for rich countries experiencing low birth rates. Illiberal Globalization Economic weakness and rising nationalism (along with multipolarity) will not end globalization, but will profoundly alter its character and greatly reduce its economic and political benefits. Liberal global institutions, under American hegemony, have served multiple purposes, enabling states to improve the quality of international relations and more fully satisfy the needs of their citizens, and provide companies with the legal and institutional stability necessary to manage the inherent risks of global investment. But under present and future conditions these institutions will become the battlegrounds—and the victims—of geopolitical competition. The Trump Administration’s frontal attack on multilateralism is but the final nail in the coffin of the Bretton Woods system in trade and finance, which has been in slow but accelerating decline since the end of the Cold War. Future American leadership may embrace renewed collaboration in global trade and finance, macroeconomic management, environmental sustainability and the like, but repairing the damage requires the heroic assumption that America’s own identity has not been fundamentally altered by the Trump era (four years or eight matters here), and by the internal and global forces that enabled his rise. The fact will remain that a sizeable portion of the American electorate, and a monolithically proTrump Republican Party, is committed to an illiberal future. And even if the effects are transitory, the causes of weakening global collaboration are structural, not subject to the efforts of some hypothetical future US liberal leadership. It is clear that the US has lost respect among its rivals, and trust among its allies. While its economic and military capacity is still greatly superior to all others, its political dysfunction has diminished its ability to convert this wealth into effective power.13 It will furthermore operate in a future system of diffusing material power, diverging economic and political governance approaches, and rising nationalism. Trump has promoted these forces, but did not invent them, and future US Administrations will struggle to cope with them. What will illiberal globalization look like? Consider recent events. The instruments of globalization have been weaponized by strong states in pursuit of their geopolitical objectives. This has turned the liberal argument on behalf of globalization on its head. Instead of interdependence as an unstoppable force pushing states toward collaboration and convergence around market-friendly domestic policies, states are exploiting interdependence to inflict harm on their adversaries, and even on their allies. The increasing interaction across national boundaries that globalization entails, now produces not harmonization and cooperation, but friction and escalating trade and investment disputes.14 The Trump Administration is in the lead here, but it is not alone. Trade and investment friction with China is the most obvious and damaging example, precipitated by China’s long failure to conform to the World Trade Organization (WTO) principles, now escalated by President Trump into a trade and currency war disturbingly reminiscent of the 1930s that Bretton Woods was designed to prevent. Financial sanctions against Iran, in violation of US obligations in the Joint Comprehensive Plan Of Action (JCPOA), is another example of the rule of law succumbing to geopolitical competition. Though more mercantilist in intent than geopolitical, US tariffs on steel and aluminum, and their threatened use in automotives, aimed at the EU, Canada, and Japan,15 are equally destructive of the liberal system and of future economic growth, imposed as they are by the author of that system, and will spread to others. And indeed, Japan has used export controls in its escalating conflict with South Korea16 (as did China in imposing controls on rare earth,17 and as the US has done as part of its trade war with China). Inward foreign direct investment restrictions are spreading. The vitality of the WTO is being sapped by its inability to complete the Doha Round, by the proliferation of bilateral and regional agreements, and now by the Trump Administration’s hold on appointments to WTO judicial panels. It should not surprise anyone if, during a second term, Trump formally withdrew the US from the WTO. At a minimum it will become a “dead letter regime.”18 As such measures gain traction, it will become clear to states—and to companies—that a global trading system more responsive to raw power than to law entails escalating risk and diminishing benefits. This will be the end of economic globalization, and its many benefits, as we know it. It represents nothing less than the subordination of economic globalization, a system which many thought obeyed its own logic, to an international politics of zero-sum power competition among multiple actors with divergent interests and values. The costs will be significant: Bloomberg Economics estimates that the cost in lost US GDP in 2019- dollar terms from the trade war with China has reached $134 billion to date and will rise to a total of $316 billion by the end of 2020.19 Economically, the just-in-time, maximally efficient world of global supply chains, driving down costs, incentivizing innovation, spreading investment, integrating new countries and populations into the global system, is being Balkanized. Bilateral and regional deals are proliferating, while global, nondiscriminatory trade agreements are at an end. Economies of scale will shrink, incentivizing less investment, increasing costs and prices, compromising growth, marginalizing countries whose growth and poverty reduction depended on participation in global supply chains. A world already suffering from excess savings (in the corporate sector, among mostly Asian countries) will respond to heightened risk and uncertainty with further retrenchment. The problem is perfectly captured by Tim Boyle, CEO of Columbia Sportswear, whose supply chain runs through China, reacting to yet another ratcheting up of US tariffs on Chinese imports, most recently on consumer goods: We move stuff around to take advantage of inexpensive labor. That’s why we’re in Bangladesh. That’s why we’re looking at Africa. We’re putting investment capital to work, to get a return for our shareholders. So, when we make a wager on investment, this is not Vegas. We have to have a reasonable expectation we can get a return. That’s predicated on the rule of law: where can we expect the laws to be enforced, and for the foreseeable future, the rules will be in place? That’s what America used to be.20 The international political effects will be equally damaging. The four structural forces act on each other to produce the more dangerous, less prosperous world projected here. Illiberal globalization represents geopolitical conflict by (at first) physically non-kinetic means. It arises from intensifying competition among powerful states with divergent interests and identities, but in its effects drives down growth and fuels increased nationalism/populism, which further contributes to conflict. Twenty-first-century protectionism represents bottom-up forces arising from economic disruption. But it is also a top-down phenomenon, representing a strategic effort by political leadership to reduce the constraints of interdependence on freedom of geopolitical action, in effect a precursor and enabler of war. This is the disturbing hypothesis of Daniel Drezner, argued in an important May 2019 piece in Reason, titled “Will Today’s Global Trade Wars Lead to World War Three,”21 which examines the preWorld War I period of heightened trade conflict, its contribution to the disaster that followed, and its parallels to the present: Before the First World War started, powers great and small took a variety of steps to thwart the globalization of the 19th century. Each of these steps made it easier for the key combatants to conceive of a general war. We are beginning to see a similar approach to the globalization of the 21st century. One by one, the economic constraints on military aggression are eroding. And too many have forgotten—or never knew—how this played out a century ago. …In many ways, 19th century globalization was a victim of its own success. Reduced tariffs and transport costs flooded Europe with inexpensive grains from Russia and the United States. The incomes of landowners in these countries suffered a serious hit, and the Long Depression that ran from 1873 until 1896 generated pressure on European governments to protect against cheap imports. …The primary lesson to draw from the years before 1914 is not that economic interdependence was a weak constraint on military conflict. It is that, even in a globalized economy, governments can take protectionist actions to reduce their interdependence in anticipation of future wars. In retrospect, the 30 years of tariff hikes, trade wars, and currency conflicts that preceded 1914 were harbingers of the devastation to come. European governments did not necessarily want to ignite a war among the great powers. By reducing their interdependence, however, they made that option conceivable. …the backlash to globalization that preceded the Great War seems to be reprised in the current moment. Indeed, there are ways in which the current moment is scarier than the pre-1914 era. Back then, the world’s hegemon, the United Kingdom, acted as a brake on economic closure. In 2019, the United States is the protectionist with its foot on the accelerator. The constraints of Sino-American interdependence—what economist Larry Summers once called “the financial balance of terror”—no longer look so binding. And there are far too many hot spots—the Korean peninsula, the South China Sea, Taiwan—where the kindling seems awfully dry. Multipolarity We can define multipolarity as a wide distribution of power among multiple independent states. Exact equivalence of material power is not implied. What is required is the possession by several states of the capacity to coerce others to act in ways they would otherwise not, through kinetic or other means (economic sanctions, political manipulation, denial of access to essential resources, etc.). Such a distribution of power presents inherently graver challenges to peace and stability than do unipolar or bipolar power configurations,22 though of course none are safe or permanent. In brief, the greater the number of consequential actors, the greater the challenge of coordinating actions to avoid, manage, or de-escalate conflicts. Multipolarity also entails a greater potential for sudden changes in the balance of power, as one state may defect to another coalition or opt out, and as a result, the greater the degree of uncertainty experienced by all states, and the greater the plausibility of downside assumptions about the intentions and capabilities of one’s adversaries. This psychology, always present in international politics but particularly powerful in multipolarity, heightens the potential for escalation of minor conflicts, and of states launching preventive or preemptive wars. In multipolarity, states are always on edge, entertaining worst-case scenarios about actual and potential enemies, and acting on these fears—expanding their armies, introducing new weapon systems, altering doctrine to relax constraints on the use of force—in ways that reinforce the worst fears of others. The risks inherent in multipolarity are heightened by the attendant weakening of global institutions. Even in a state-centric system, such institutions can facilitate communication and transparency, helping states to manage conflicts by reducing the potential for misperception and escalation toward war. But, as Waheguru Pal Singh Sidhu argues in his chapter on the United Nations, the influence of multilateral institutions as agent and actor is clearly in decline, a result of bottom-up populist/nationalist pressures experienced in many countries, as well as the coordination problems that increase in a system of multiple great powers. As conflict resolution institutions atrophy, great powers will find themselves in “security dilemmas”23 in which verification of a rival’s intentions is unavailable, and worst-case assumptions fill the gap created by uncertainty. And the supply of conflicts will expand as a result of growing nationalism and populism, which are premised on hostility, paranoia, and isolation, with governments seeking political legitimacy through external conflict, producing a siege mentality that deliberately cuts off communication with other states. Finally, the transition from unipolarity (roughly 1989–2007) to multipolarity is unregulated and hazardous, as the existing superpower fears and resists challenges to its primacy from a rising power or powers, while the rising power entertains new ambitions as entitlements now within its reach. Such a “power transition” and its dangers were identified by Thucydides in explaining the Peloponnesian Wars,24 by Organski (the “rear-end collision”)25 during the Cold War, and recently repopularized and brought up to date by Graham Allison in predicting conflict between the US and China.26 A useful, and consequential illustration of the inherent challenge of conflict management during a power transition toward multipolarity, is the weakening of the arms control regime negotiated by the US and the Soviet Union during the Cold War. Despite the existential, global conflict between two nuclear armed superpowers embracing diametrically opposed world views and operating in economic isolation from each other, the two managed to avoid worst-case outcomes. They accomplished this in part by institutionalizing verifiable limits on testing and deployment of both strategic and intermediate-range nuclear missiles. Yet as diplomatically and technically challenging as these achievements were, the introduction of a third great power, China, into this twocountry calculus has proven to be a deal breaker. Unconstrained by these bilateral agreements, China has been free to build up its capability, and has taken full advantage in ramping up production and deployment of intermediate-range ground-launched cruise missiles, thus challenging the US ability to credibly guarantee the security of its allies in Asia, and greatly increasing the costs of maintaining its Asian regional hegemony. As a result, the Intermediate Nuclear Force treaty is effectively dead, and the New Start Treaty, covering strategic missiles, is due to expire next year, with no indication of any US–Russian consensus to extend it. The US has with logic indicated its interest in making these agreements trilateral; but China, with its growing power and ambition, has also logically rejected these overtures. Thus, all three great powers are entering a period of nuclear weapons competition unconstrained by the major Cold War arms control regimes. In a period of rapid advances in technology and worsening great power relations, the nuclear competition will be a defining characteristic of the next decade and beyond. This dynamic will also complicate nuclear nonproliferation efforts, as both the demand for nuclear weapons (a consequence of rising regional and global insecurity), and supply of nuclear materials and technology (a result of the weakening of the nonproliferation regime and deteriorating great power relations) will increase. Will deterrence prevent war in a world of several nuclear weapons states, (the current nuclear powers plus South Korea, Iran, Saudi Arabia, Japan, Turkey), as it helped to do during the bipolar Cold War? Some neorealist observers view nuclear weapons proliferation as stabilizing, extending the balance of terror, and the imperative of restraint, to new nuclear weapons states with much to fight over (Saudi Arabia and Iran, for example).27 Others,28 examining issues of command and control of nuclear weapons deployment and use by newly acquiring states, asymmetries in doctrines, force structures, and capabilities between rivals, the perils of variable rates in transition to weapons deployment, problems of communication between states with deep mutual grievances, the heightened risk of transfer of such weapons to non-state actors, have grave doubts about the safety of a multipolar, nuclear-armed world.29 We can at least conclude that prudence dictates heightened efforts to slow the pace of proliferation, while realism requires that we face a proliferated future with eyes wide open. The current distribution of power is not perfectly multipolar. The US still commands the world’s largest economy, and its military power is unrivaled by any state or combination of states. Its population is still growing, despite a recent decline in birth rates. It enjoys extraordinary geographic advantages over its rivals, who are distant and live in far worse neighborhoods. Its economy is less dependent on foreign markets or resources. Its political system has proven—up to now—to be resilient and adaptable. Its global alliance system greatly extends its capacity to defend itself and shape the world to its liking and is still intact, despite growing doubts about America’s reliability as a security guarantor. Based on these mostly material and historical criteria, continued American primacy would seem to be a good bet, if it chooses to use its power in this way.30 So why multipolarity? The clearest and most frequently cited evidence for a widening distribution of global power away from American unipolarity is the narrowing gap in GDP between the US and China. The IMF’s World Economic Outlook forecasts a $0.9 trillion increase in US GDP for 2019–2020, and a $1.3 trillion increase for China in the same period.31 Many who support the American primacy case argue that GDP is an imperfect measure of power, that Chinese GDP data is inflated, that its growth rates are in decline while Chinese debt is rapidly increasing, and that China does poorly on other factors that contribute to power—its low per capita GDP, its political succession challenges, its environmental crisis, its absence of any external alliance system. Yet GDP is a good place to start, as the single most useful measure and long-term predictor of power. It is from the overall economy that states extract and apply material power to leverage desired behavior from other states. It is true that robust future Chinese growth is not guaranteed, nor is its capacity to convert its wealth to power, which is a function of how well its political system works over time. But this is equally the case for the US, and considering recent political developments is not a given for either country. As an alternative to measuring inputs—economic size, political legitimacy, technological innovation, population growth—in assessing relative power and the nature of global power distribution, we should consider outputs: what are states doing with their power? The input measures are useful, possibly predictive, but are usually deployed in the course of making a foreign policy argument, sometimes on behalf of a reassertion of American primacy, sometimes on behalf of retrenchment. As such, their objectivity (despite their generous deployment of “data”) is open to question. What is undeniable, to any clear-eyed observer, is a real decline in American influence in the world, and a rise in the influence of other powers, which predates the Trump administration but has accelerated into America’s free fall over the last four years. This has produced a de facto multipolarity, whether explainable in the various measures of power—actual and latent—or not. This decline results in part from policy mistakes: a reckless squandering of material power and legitimacy in Iraq, an overabundance of caution in Syria, and now pure impulsivity. But more fundamentally, it is a product of relative decline in American capacity—political and economic—to which American leadership is adjusting haphazardly, but in the direction of retrenchment/restraint. It is highly revealing that the last two American presidents, polar opposites in intellect, temperament and values, agreed on one fundamental point: the US is overextended, and needs to retrench. The fact that neither Obama nor Trump (up to this point in his presidency) believed they had the power at their disposal to do anything else, tells us far more about the future of American power and policy—and about the emerging shape of international relations—than the power measures and comparisons made by foreign policy advocates. Observation of recent trends in US versus Russian relative influence prompts another question: do we understand the emerging characteristics of power? Rigorously measuring and comparing the wrong parameters will get us nowhere at best and mislead us into misguided policies at worst. How often have we heard, with puzzlement, that Putin punches far above his weight? Could it be that we misunderstand what constitutes “weight” in the contemporary and emerging world? Putin may be on a high wire, and bound to come crashing down; but the fact is that Russian influence, leveraging sophisticated communications/social media/influence operations, a strong military, an agile (Putin-dominated) decision process, and taking advantage of the egregious mistakes by the West, has been advancing for over a decade, shows no sign of slowing down, and has created additional opportunities for itself in the Middle East, Europe, Asia, Latin America, the Arctic. It has done this with an economy roughly the size of Italy’s. There are few signs of a domestic political challenge to Putin. His external opponents are in disarray, and Russia’s main adversary is politically disabled from confronting the problem. He has established Russia as the Middle East power broker. He has reached into the internal politics of his Western adversaries and influenced their leadership choices. He has invaded and absorbed the territory of neighboring states. His actions have produced deep divisions within NATO. Again, simple observation suggests multipolarity in fact, and a full explanation for this power shift awaiting future historians able to look with more objectivity at twenty-first-century elements of power. When that history is written, surely it will emphasize the extraordinary polarization in American politics. Was multipolarity a case of others finding leverage in new sources of power, or the US underutilizing its own? The material measures suggest sufficient capacity for sustained American primacy, but with this latent capacity unavailable (as perceived, I believe correctly, by political leadership) by virtue of weakening institutions: two major parties in separate universes; a winnertake-all political mentality; deep polarization between the parties’ popular bases of support; divided government, with the Presidency and the Congress often in separate and antagonistic hands; diminishing trust in the permanent government, and in the knowledge it brings to important decisions, and deepening distrust between the intelligence community and policymakers; and, in Trump’s case, a chaotic policy process that lacks any strategic reference points, mis-communicates the Administration’s intentions, and has proven incapable of sustained, coherent diplomacy on behalf of any explicit and consistent set of policy goals. Rising Nationalism/Populism/Authoritarianism The evidence for these trends is clear. Freedom House, the go-to authority on the state of global democracy, just published its annual assessment for 2020, and recorded the fourteenth consecutive year of global democratic decline and advancing authoritarianism. This dramatic deterioration includes both a weakening in democratic practice within states still deemed on balance democratic, and a shift from weak democracies to authoritarianism in others. Commitment to democratic norms and practices—freedom of speech and of the press, independent judiciaries, protection of minority rights—is in decline. The decline is evident across the global system and encompasses all major powers, from India and China, to Europe, to the US. Right-wing populist parties have assumed power, or constitute a politically significant minority, in a lengthening list of democratic states, including both new (Hungary, Poland) and established (India, the US, the UK) democracies. Nationalism, frequently dismissed by liberal globalization advocates as a weak force when confronted by market democracies’ presumed inherent superiority, has experienced a resurgence in Russia, China, the Middle East, and at home. Given the breadth and depth of right-wing populism, the raw power that promotes it—mainly Russian and American—and the disarray of its liberal opponents, this factor will weigh heavily on the future. The major factors contributing to right-wing populism and its global spread is the subject of much discussion.32 The most straightforward explanation is rising inequality and diminished intergenerational mobility, particularly in developed countries whose labor-intensive manufacturing has been hit hardest by the globalization of capital combined with the immobility of labor. Jobs, wages, economic security, a reasonable hope that one’s offspring has a shot at a better life than one’s own, the erosion of social capital within economically marginalized communities, government failure to provide a decent safety net and job retraining for those battered by globalization: all have contributed to a sense of desperation and raw anger in the hollowed-out communities of formerly prosperous industrial areas. The declining life expectancy numbers33 tell a story of immiseration: drug addition, suicide, poor health care, and gun violence. The political expression of such conditions of life should not be surprising. Simple, extremist “solutions” become irresistible. Sectarian, racial, regional divides are strengthened, and exclusive identities are sharpened. Political entrepreneurs offering to blow up the system blamed for such conditions become credible. Those who are perceived as having benefited from the corrupt system—long-standing institutions of government, foreign countries and populations, immigrants, minorities getting a “free ride,” elites—become targets of recrimination and violence. The simple solutions of course, don’t work, deepening the underlying crisis, but in the process politics is poisoned. If this sounds like the US, it should, but it also describes major European countries (the UK, France, Italy, Germany, Poland, Hungary, the Czech Republic), and could be an indication of things to come for non-Western democracies like India. We have emphasized throughout this chapter the interaction of four structural forces in shaping the future, and this interaction is evident here as well. Is it merely coincidence that the period of democratic decline documented by Freedom House, coincides precisely with the global financial and economic crisis? Lower growth, increasing joblessness, wage stagnation, superimposed on longer-term widening of inequality and declining mobility, constitute a forbidding stress test for democratic systems, and many continue to fail. And if we are correct about secular stagnation, the stress will continue, and authoritarianism’s fourteen-year run will not be over for some time. The antidemocratic trend will gain additional impetus from the illiberal direction of globalization, with its growth suppressing protectionism, weaponization of global economic exchange, and weakening global economic institutions. Multipolarity also contributes, in several ways. The former hegemon and author of globalization’s liberal structure has lost its appetite, and arguably its capacity, for leadership, and indeed has become part of the problem, succumbing to and promoting the global right-wing populist surge. It is suffering an unprecedented decline in life expectancy, and recently a decline in the birth rate, signaling a degree of rot commonly associated with a collapsing Soviet Union. While American politics may once again cohere around its liberal values and interests, the time when American leadership had the self-confidence to shape the global system in its liberal image is gone. It may build coalitions of the like-minded to launch liberal projects, but there will be too much power outside these coalitions to permit liberal globalization of the sort imagined at the end of the Cold War. In multipolarity, the values around which global politics revolve will reflect the diversity of major powers, their interests, and the norms they embrace. Convergence of norms, practices, policies is out of the question. Global collective action, even in the face of global crises, will be a long shot. To expect anything else is fantasy Unbrave New World and Future Challenges At the outset of this chapter we described these structural forces as interacting to produce more conflict and diminished prosperity. We also predicted a world with shrinking collective capacity to address new challenges as they arise. What specifically will such a world look like? We address below three principal challenges to global problem solving over the next decade. Interstate Conflict In the world experienced by most readers of this volume, conflict is observed within weak states, sometimes promoted by regional competitors, by terrorist groups, or by great powers, acting through surrogates or by indirect means. Sometimes, as in Syria, this conflict spills over to contiguous states and contributes to regional instability, and challenges other regions to respond effectively, a challenge that Europe has not met. Much of this will continue, but the global significance of such local conflicts will be greatly magnified by increasing great power conflict, which will feed—rather than manage or resolve—local instabilities and will in turn be exacerbated by them. Great powers will jockey for advantage, support their local partners, escalate preemptively. Conflicts initially confined to failing states or unstable regions will be redefined by great powers as global in scope and significance. This tendency of states to view local conflicts in the context of a zero-sum, global struggle for power is familiar to students of the Cold War, but now with the additional challenges to collective action, expanded uncertainty and worst-case thinking associated with the power transition to multipolarity. We can easily observe increased conflict in US–China relations, as we will in US–Russia relations as future US administrations try to make up for ground lost during the Trump presidency, especially in the Middle East. We can observe it among powerful states with mutual historical grievances, now with a weakening presence of the hegemonic security guarantor and having to consider the renationalization of their defense: Japan-South Korea, Germany-France. We can observe it among historical rivals operating in rapidly changing security landscapes: India-China. We can observe it within the Middle East, as internal rivalries are appropriated by regional powers in a contest for regional dominance. We can observe it clearly in Syria, where the regime’s violent suppression of Arab Spring resistance led to all-out civil war, attracted outside support to proxy forces by aspiring regional hegemons Saudi Arabia and Iran, enabled the rise of ISIS, and eventually to great power intervention, principally by Russia. In a world of effective great power collaboration or American primacy, the Syrian civil war might have been settled through power sharing or partition, or if not, contained within Syria. The collapse of Yugoslavia, occurring during a period of US “unipolarity” and managed effectively, demonstrates the possibilities. Instead, with the US retrenching, Middle East rivals unconstrained by great powers, and great power competition rising, the Syria civil war was fed by outside powers, then metastasized into the region, and—in the form of refugee flows—into Europe, fundamentally altering European politics. Libya may be at the early stages of this scenario. This is not the end of the Syria story. Russia has established itself as a major player in Syria and the Middle East’s power broker, the indispensable country with leverage throughout the region. China is poised to reap the financial and power benefits of Syrian reconstruction. The US has just demonstrated, in its act of war against the Iranian regime, its willingness, without consultation, to put its allies’ security in further jeopardy, accentuating the risks of security ties with Washington and generating added opportunities for Russia and China. The purpose here is not to critique US policy, but to point out the dramatically shifting power balance in a critical region, toward multipolarity. The dangers of such a shift will become apparent as some future US president attempts to reassert US influence in the region and finds a crowded playing field. Can a multipolar distribution of power among several states whose interests, values, and political practices are divergent, all experiencing bottom-up nationalist pressures, all seeking advantages in the oversupply of regional instability, be made to work? I think not. Will this more dangerous world descend into direct military confrontation between great powers, and could such confrontation lead to use of nuclear weapons? Here the question becomes, what will this more dangerous world actually look like; what instruments of coercion will be available to states as technology change accelerates; how will states employ these instruments; how will deterrence work (if at all) among several states with large but unequal levels of destructive capacity, weak command, and control, disparate— or opaque—strategies and simmering rivalries; can conflict management work in a world of weak institutions? The collapse of the Cold War era nuclear arms control regime, the threat to the Non-Proliferation Treaty represented by the demise of the JCPOA, and multiple indications of an accelerating nuclear arms race among the three principle powers, augurs badly. Given the structural forces at play, and without predicting the worst, we are indeed entering perilous times. Global Poverty and Inequality Despite the challenges of volatility and disruptive change inherent in globalization, the world under American liberal leadership has managed a dramatic reduction of extreme poverty. According to World Bank estimates, in 2015, 10 percent of the world’s population lived on less than $1.90 a day, down from nearly 36 percent in 1990.34 In fact, as of September 2018, half the world is now middle class or wealthier.35 The uneven success of the UN Millennium Development Goals (MDGs) exemplifies this achievement, and demonstrates what is possible when open markets are managed through strong global institutions, effective leadership and interstate collaboration. What this liberal hegemonic system did not achieve, however, was a fair distribution of the gains from globalization within states, and among those states that for various reasons were not full participants in this system. This record of partial achievement leaves us with a full agenda for the next fifteen years, but without the hegemonic leadership, strong institutions, ascendant liberalism or robust global growth that enabled previous gains. There are powerful reasons to question the sustainability of these poverty reduction gains, leading to doubts about the realization of the Sustainable Development Goals, which have replaced the MDGs as global development targets.36 (See Jens Rudbeck’s chapter and Sidhu’s UN chapter for SDGs). Skeptics have pointed to slowing global growth, specifically in China, whose demand for imported commodities was a major factor in developing country growth and job creation; growing protectionism in developed country markets, fueled by bottom-up forces of nationalism, and from top-down by a weakened global trading regime and increased geopolitical rivalry; the effects of accelerating climate change on agriculture, migration and communal conflict in poor countries; and the growth burst among poor countries from the rapid transition to more efficient use of resources, a transition that is now slowing down.37 Perhaps the greatest concern in this scenario is a general deterioration in the developing country foreign investment climate. Foreign direct investment (FDI) has been a major contributor to growth, job creation, and poverty alleviation among poor countries. It has incentivized growthfriendly policies, reduced corruption, introduced technology and effective management practices, and linked poor countries to foreign markets through global supply chains.38 It has stimulated growth of indigenous manufacturing and service companies to supply new foreign investments. It has been the major cause of economic convergence between rich and poor countries. From 2000 to 2009, developing economies’ growth rates were more than four percentage points higher than those of rich countries, pushing their share of global output from just over a third to nearly half.39 However, FDI flows into poor countries are imperiled by the structural forces discussed here. Political instability arising from slower growth and environmental stress will increase investors’ perception of higher risk, reinforcing their developed country bias. Protectionism among developed countries will threaten the global market access upon which manufacturing investment in developing countries is premised, causing firms to pare back their global supply chains. As companies retrench from direct investment in poor countries, the appeal to those countries of Chinese debt financed infrastructure projects, under the Belt-Road Initiative with little or no conditionality, but at the risk of “debt traps,” will increase. Global Warming The question posed at the beginning of this section is whether the international system, evolving toward multipolarity and rising nationalism, will find the collective political capital to confront challenges as they arise. Global warming is the mother of all challenges, and the weakness in the system’s capacity to respond is clear. With the two major political/economic powers and greenhouse gas emitters locked in deepening geopolitical conflict (and with one of them locked in climate change denial, possibly through 2024), the chances of significantly slowing global warming or even ameliorating its effects are very slim. We are reduced to the default option, nation-specific adaptation to climate change, which will impose rising human, political and economic costs on all, and will widen the gap between rich countries with adaptive capacity (of varying degrees), and the poor, who will suffer deteriorating economic, political, and social conditions. (For a contrary, optimistic view see Michael Shank’s chapter, which credits new actors—like cities—as playing a more constructive role in climate mitigation.) This would bring to a close liberal globalization’s greatest achievement; the raising of 1.1 billion people out of extreme poverty since 1990,40 with all its associated gains in quality of life (in the WHO Africa region, for example, life expectancy rose by 10.3 years between 2000 and 2016, driven mainly by improvements in child survival and expanded access to antiretrovirals for treatment of HIV).41 Several forces are at work here. The problem itself is graver—in magnitude and in rate of worsening—than predicted by climate scientists. The UN Intergovernmental Panel on Climate Change (IPCC), the major source of information on global warming, has consistently underpredicted the rate of climate deterioration. This holds true even for its “worst-case scenarios,” meaning that what was meant as a wake-up call has in fact reinforced complacency.42 (see Michael Shank’s chapter for further discussion of climate change). The IPCC, in its 2019 report, has tried to undo the damage by emphasizing the acceleration in the rate of warming and its effects, the only partially understood dynamic of climate change, and—given wide uncertainty—the possibility of unpleasant surprises yet to come. This strengthens the scientific case for urgency—to both severely limit greenhouse gas emissions, and to increase investment in ameliorating the effects. Unfortunately, the crisis comes at a moment when the climate for collective action is ice cold. Geopolitical competition incentivizes states to out produce each other, regardless of the environmental effects. Multipolarity complicates collective action. Economic stagnation mandates job creation, making regulation politically toxic. Bottom-up nationalism/populism causes states to pursue “relative gains,” meaning that if the nation is seen as gaining in a no-holds-barred economic competition with others, the negative environmental effects can be tolerated. A post-Trump presidency would help, with the US rejoining the Paris Agreement, and lending its weight to tighter regulation, increased R and D, and stronger economic incentives to reduce carbon emissions. Keep in mind, however, that President Obama was fully behind such efforts, but in a deeply polarized America was unable to implement measures needed to fulfill the Paris obligations through legislation, and his executive orders to do this were swiftly overturned by Trump. Conclusion It may be tempting to hope that post-Trump, the US can regain its global leadership and exert its considerable power in a liberal direction, but with enough self-awareness of its relative decline to share responsibility with others. This was, I believe, the broad direction of the Obama strategy, evidenced by the JCPOA and the Trans-Pacific Partnership: liberal, collective solutions to global problems, as US dominance receded. This would constitute an optimistic scenario, and it confronts two major problems: can US internal politics support it (can, for example, the country legislate controls on carbon, essential for the global credibility and durability of such commitments); and is the world ready to reengage with American leadership, given the damage to its reputation and the structural forces discussed in this chapter? My educated guess is no, on both counts. The rot within is extensive, the concrete evidence clear in the economic inequality/immobility numbers, the life expectancy numbers, the deep political polarization, between the two major parties, between regions, between cities and rural areas. We are in fact a long way from fitness for global leadership, and the recognition of this by others will accelerate the decline of American influence. The rest of the world is well on its way toward adjusting to post-American hegemony, some by renationalizing their defense, or by cutting deals with adversaries, by building new alliances or by seizing new opportunities for influence in the vacuum left by American retrenchment. The evidence for this will accumulate. Observe the current and emerging Middle East, where all these post-hegemonic strategies are visible.

### AI/Data Adv

#### Data hording inhibits US AI Innovation

**Wheeler 20** (Tom Wheeler served as 31st Chairman of the Federal Communications Commission (FCC) from 2013-2017. He is a visiting fellow at the Brookings Institution and a senior fellow at the Harvard Kennedy School.; “DIGITAL COMPETITION WITH CHINA STARTS WITH COMPETITION AT HOME”; APRIL 2020; <https://www.brookings.edu/research/digital-competition-with-china-starts-with-competition-at-home/>; AS)

America’s dominant tech companies have seized upon the competition with China as a rationale for why their behavior should not be subject to regulatory oversight that would, among other things, promote competition. “China doesn’t regulate its companies” has become a go-to policy response. When coupled with “of course, we support regulation, but it must be responsible regulation,” it throws up a smokescreen that allows the dominant tech companies to make the rules governing their marketplace behavior. At the heart of digital competition — both at home and abroad — is the capital asset of the 21st century: data. Initiatives such as machine learning and artificial intelligence are data-dependent, requiring a large data input to enable algorithms to reach a conclusion. China’s immense population of almost 1.5 billion gives it an advantage in this regard. By definition, a population that approaches five times the size of the U.S. population produces more data. The previously “backward” nature of the Chinese economy has resulted in another Chinese data advantage: New smartphone-based apps, created in place of the digital integration that China previously lacked, produce a richer collection of data. This bulk and richness of Chinese data creates an inherent digital advantage when compared to the United States. If the United States will never out-bulk China in the quantity and quality of data, it must out-innovate China. Here, the United States has an advantage, should it choose to take it. The centralized control of the Chinese digital economy is an anti-entrepreneurial force. In contrast, innovation is the hallmark of a free and open market. But the domestic market must, indeed, be free, open, and competitive. Currently, the American digital marketplace is not competitive. A handful of companies command the marketplace by hoarding the data asset others need to compete. As innovative as America’s tech giants may be, they represent a bottleneck that starves independent innovators of the mother’s milk of digital competition. If America is to out-innovate China, then American innovators need access to the essential data asset required for that innovation. The nation’s response to Chinese competition must not be the adoption of China-like national champions, nor the “China doesn’t regulate its companies that way” smokescreen. American public policy should embrace the all-American concept of competition-driven innovation. This begins with breaking the bottleneck that withholds data from its competitive application. This does not necessarily mean breaking up the dominant companies, but it does mean breaking open their mercenary lock on the assets essential for competition-driven innovation.

#### Data is king for AI–smart cities and a laundry list of emerging innovation potential

**Lucas and Waters** **2018**, Louise Lucas in Hangzhou and Richard Waters in San Francisco, Financial Times, “China and US compete to dominate big data” May 1, 2018, NexisUni. <https://www.ft.com/content/e33a6994-447e-11e8-93cf-67ac3a6482fd> //DELO

Chinese attitudes to data privacy are becoming slightly less lax, but regulations are still a million miles from Europe, which is at the other end of the spectrum and will introduce tough privacy rules later this month known as General Data Protection Regulation. Yet American companies like Facebook, Google and Amazon also have masses of data, says Mr Wu at Yitu. That suggests that general-purpose AI applications like facial recognition will be the preserve of all “the big platforms”, regardless of their country of origin, says James Manyika, a partner at McKinsey. By contrast, more specialised applications could be perfected where the data are the richest. When it comes to manufacturing, for instance, China is “collecting a lot more data”, he says. This data advantage could be greatest in fields where regulation has made access to information harder, or prevented it being collected in the first place, according to some experts. Earlier this year, Google published promising research suggesting it could predict the risk of heart attack by using image-recognition software to study retinal blood vessels. The research relied heavily on UK Biobank, a database drawing on a detailed study of volunteers in Britain beginning in 2006. Yet only 631 people in the Biobank had medical conditions relevant to the research. That made the data set “relatively small for deep learning”, Google said, reducing the effectiveness of the algorithm it was able to train on the information. Chinese medical AI researchers, by contrast, have been able to tap into far bigger data sets, according to one expert. If China is rich in data, then it also has the economic opportunities to exploit it — something that has helped lure back many haigui, or returning “sea turtles”, like Mr Jin. AI is being harnessed in law, where machines have replaced stenographers in more than 6,000 courts; on the roads to manage traffic; in hospitals to detect tumours; and in Shanghai subway stations where you can buy tickets by talking to the machine. “AI has the biggest opportunity in China versus any western countries,” says Mr Rong. Chinese executives talk about a smart city scheme that halved the time it takes to speed ambulances from depot to patient to hospital, by dint of switching traffic flows and traffic lights. The smart cities scheme also offers another point of difference with the US: collaboration between state and private companies on a large scale. In addition to projects aimed at traffic management, crowd control, finding missing children and elderly, cutting down hospital waiting times — the list goes on — all the big tech players have joint research labs with government. This is part of a broader experimentation that is lacking in the US, says Mr Wu. “Overall, the Chinese tech scene is more dynamic right now, particularly in terms of trying out new ideas and new products,” he says. “People are just trying out more new things.” That has not been lost on investors in the US. One leading Silicon Valley venture capitalist puts the difference in AI opportunities bluntly: “The business is bigger and better in China.” This economic momentum behind AI is closely aligned with a second powerful force: a sense of national mission. That has brought a hydrant of money and clear industrial policy. This state-led strategy is also closely aligned with national champions Baidu, Alibaba and Tencent — all private companies. Washington has done much less to promote a national agenda. “What’s the national direction around AI and robotics [in the US]? It’s nothing. It’s missing,” says the Silicon Valley investor. “The government is flailing around.” Worse, the Trump administration’s attempts to clamp down on immigration has upset the US tech industry, which has drawn heavily on overseas talent — not least Indian and Chinese engineers. The heads of AI at Apple, Facebook and Microsoft, as well as Google’s cloud computing division, were all born outside the US. “We’ve seen more and more students choosing not to come to the US,” says Mr Etzioni. “We’re in the process of shooting ourselves in the head.” He points to one sign of how the talent pendulum is swinging away from the US: Google and Microsoft have both opened AI research centres in China to tap the AI workforce there. Yet the expertise advantage that the US has will not disappear overnight. Companies like Yitu are moving in the opposite direction because they believe the US west coast is still the magnet for many of the world’s top engineering brains. “Half the AI engineers in Silicon Valley are Chinese,” says Mr Wu.

#### Changing Polarity in Asia causes US-China Nuclear War and Extinction—MAD and Interdependence Don’t Check

Van Ness ‘17 (Peter, Visiting Fellow in the Department of International Relations at the Coral Bell School, The Australian National University, “Is a War between China and America Simply Unstoppable?”; August 17, 2017; <http://nationalinterest.org/blog/the-buzz/war-between-china-america-simply-unstoppable-21935>; RMW)

Building his analysis on Thucydides’ study of the Peloponnesian War, Graham Allison and his colleagues have studied the classic international relations problem of military conflict between a rising power and an established dominant power. They identified 16 such situations over the past 500 years, and found that 12 of them ended in war — painting a gloomy picture of the future of US–China relations. Critics of Allison’s work have argued that the relationship between the United States and China is very different. They are deeply interdependent both economically and politically, with sustained communication between the US and Chinese militaries. Others note that mutual assured destruction means that a US–China nuclear war would be suicidal, making even the suggestion of war between the two countries unthinkable. These are valid reservations but there are three key points missing in [critics’ dismissal](http://www.eastasiaforum.org/2015/11/06/south-china-sea-tensions-unlikely-to-lead-to-war/) of Allison’s warnings. These are the unprecedented risk involved in nuclear war, the positioning of today’s militaries and the reality of an erratic and unpredictable president of the United States. Since the sole [use of nuclear weapons](http://www.eastasiaforum.org/2016/08/24/no-first-use-nuclear-pledge-bad-for-us-standing-in-asia/) in wartime — the 1945 attacks on Hiroshima and Nagasaki — scholars have meticulously assessed the likely human cost of any subsequent use of nuclear weapons. Such studies have become of particular importance considering that the capacity of the weapons held in the arsenals of the nine nuclear powers today is many times more destructive than what was unleashed in the World War II bombings. The consensus is that a nuclear exchange between any two of the major powers would result in the deaths of hundreds of thousands — if not millions — of civilians, as well as the likely advent of a so-called ‘nuclear winter’ in at least the Northern Hemisphere that would make human existence difficult, if not impossible**.** Never have we faced such possibilities of mass destruction. The Bulletin of the Atomic Scientists’ Doomsday Clock is set at three minutes to midnight, the closest to disaster since the 1980s. The second point that many critics ignore is that the United States, China and Russia have all trained and positioned their militaries to launch a nuclear attack on the others at literally a moment’s notice. Admiral Scott Swift, Commander of the US Pacific fleet, [was once asked](http://www.npr.org/sections/thetwo-way/2017/07/27/539733586/admiral-says-hed-launch-a-nuclear-strike-on-china-if-trump-ordered-it) whether he would follow through if US President Donald Trump ordered him to launch a nuclear attack on China. He replied in the affirmative, citing the foundational principle of civilian control over the military. US military forces, like the militaries of all nuclear powers, are trained to engage in nuclear war in obedience to the command of their political leader, without hesitation or reconsideration. Third, the Thucydides Trap argument is a structural analysis, focused on the changing material capabilities of competing powers. But [the presidency of Donald Trump](http://www.eastasiaforum.org/2017/08/06/how-has-china-managed-to-get-along-with-trump/) requires us to add another dimension to the problem: the role of political leaders. To date, Trump’s presidency has been inept and [dangerously destabilising](http://www.eastasiaforum.org/2017/01/26/trumps-twitter-diplomacy-troubles-us-china-relations/)**.** Moreover, public criticism of his behaviour has apparently caused him to behave even more erratically and defensively. This kind of leadership makes the likelihood of confrontation and conflict even greater. It is vital to understand just how extraordinary are the times in which we live. Unlike the 5th century BC of Thucydides’ Greece, the stakes today are higher, the dangers are greater, and the need to take constructive action is more urgent than at any time before.

#### Data-Rich AI Models Lead to Accelerated Vaccine Delivery

MIT et al 20 (MIT Technology Review Insights is the custom publishing division of MIT Technology Review, the world’s longest-running technology magazine, backed by the world’s foremost technology institution—producing live events and research on the leading technology and business challenges of the day. Insights conducts qualitative and quantitative research and analysis in the US and abroad and publishes a wide variety of content, including articles, reports, infographics, videos, and podcasts. And through its growing MIT Technology Review Global Panel, Insights has unparalleled access to senior-level executives, innovators, and thought leaders worldwide for surveys and in-depth interviews; Genesys is the global leader in cloud customer experience and contact center solutions; Philips; "The global AI agenda: Promise, reality, and a future of data sharing”; March 26, 2020; https://mittrinsights.s3.amazonaws.com/AIagenda2020/GlobalAIagenda.pdf; AS)

Share your data to help AI work for everyone. Hoarding data will eventually prove self-defeating, as companies come to find that the gains to AI model performance from data sharing outweigh any risks involved. Beyond commercial gains, societies will also benefit when data-rich AI models lead to accelerated vaccine discovery, for example, safer roads, or more reliable public transport. Much needs to be done to build confidence in data sharing, but technology advances in areas such as blockchain and federated learning are likely to make it a safer proposition.

#### Vaccines are also crucial to stopping future pandemics—but reassuring the public about their safety is crucial:

Julie L. Gerberding, M.D., M.P.H., and Barton F. Haynes, M.D., 2/4/2021 (New England Journal of Medicine, “Vaccine Innovations — Past and Future,” <https://www.nejm.org/doi/full/10.1056/nejmp2029466>, Retrieved 8/2/2021)

Vaccination is a powerful method of disease prevention that is relevant to people of all ages and in all countries, as the Covid-19 pandemic illustrates. Vaccination can improve people’s chances of survival, protect communities from new and reemerging health threats, and enhance societal productivity. But achieving the promise of vaccination requires much more than the vaccines themselves. It requires appropriate incentives to encourage the timely discovery and development of innovative, effective, safe, and affordable products; effective financing and delivery programs; and credible scientific leaders who can provide evidence-based policy recommendations and reassure the public about the value of the vaccines. Since its inception 50 years ago, the National Academy of Medicine (NAM), previously known as the Institute of Medicine (IOM), has been an authoritative resource on medical issues, including vaccination, and a global leader in vaccine-policy development. FDA Licensure Dates for Selected Innovative Vaccines since 1970. It’s hard to overstate the benefits that innovative vaccines deployed in the past five decades have had on morbidity and mortality (see timeline).1 The incidence of vaccine-preventable diseases among U.S. children has decreased dramatically, an achievement that is attributable in part to high vaccine-coverage rates. By the 2018–2019 school year, coverage rates among kindergarteners exceeded 90% in all but two states, according to data from the Centers for Disease Control and Prevention (CDC). Four vaccine-preventable illnesses have been eliminated from the Americas: smallpox in 1971, poliomyelitis in 1994, and rubella and congenital rubella syndrome in 2015 (one of us is an executive vice president at Merck, which produces vaccines for rubella, among other vaccines). Moreover, between 2011 and 2020, immunization programs in low-income countries saved an estimated 23.3 million lives.2 Perhaps the most notable immunization-related accomplishment during the past half century was the eradication of smallpox, which was verified by the World Health Organization (WHO) in 1980. In addition, global cases of paralytic polio have decreased by 99.95% from the estimated 350,000 cases in 1988,3 when the global polio-eradication program was announced, and two of the three wild-type polioviruses, WPV types 2 and 3, have been eradicated. Other important achievements during this period include the 1986 approval of the first vaccine based on recombinant technology, a hepatitis B vaccine that not only has reduced rates of the infection in many countries but was also the first vaccine to reduce cancer risk. In 1987, the first polysaccharide-protein conjugate vaccine was licensed; since then, the incidence of invasive Haemophilus influenzae type b disease among children has fallen dramatically. In 2009, a vaccine for Neisseria meningitidis group A became the first licensed vaccine specifically designed for certain people in low-income countries. Achieving broad population health benefits associated with vaccination requires effective policies that create incentives for vaccine development, ensure financing of vaccines, and improve access. After a measles outbreak in 1989–1991, the U.S. Vaccines for Children Program was authorized in 1993 to ensure that eligible children would have free access to all CDC-recommended vaccines. To address remaining gaps, the IOM in 2000 issued a landmark report that recommended policy and programmatic improvements to strengthen U.S. immunization programs. One outcome of this effort was the requirement included in the 2010 Affordable Care Act that plans provide first-dollar coverage (coverage without copayments or other cost sharing) for vaccines recommended by the CDC’s Advisory Committee on Immunization Practices for children and adults up to age 26. Policy advances have also enhanced the effects of vaccination globally. The WHO launched the Expanded Program on Immunization in 1974 to increase access to vaccines. Beginning in 2000, the benefits of this program were greatly enhanced by the creation of Gavi, the Vaccine Alliance, an international public–private partnership that provides financial and programmatic support to ensure that children in the poorest countries have access to vaccines. In 2017, with the support of the NAM and other organizations, this model was used as a framework for the creation of the Coalition for Epidemic Preparedness Innovations to fund innovative vaccines and other countermeasures against pathogens that cause devastating public health consequences, such as the Ebola virus and now SARS-CoV-2. Because vaccines are usually administered to healthy people, maintaining the highest safety standards isn’t only an ethical imperative but is also essential to sustaining public trust. The story of vaccine progress has been punctuated by both real and misguided safety concerns for as long as vaccines have been in use. Such concerns have included adverse events associated with vaccination itself, quality lapses in the manufacturing process, and false alarms regarding vaccine safety. The potential for financial gain has fueled liability suits related to putative safety concerns. The NAM has conducted ongoing objective assessments of vaccine safety to help address concerns. Between 2000 and 2004, its Immunization Safety Review Committee evaluated evidence pertinent to various vaccine-safety topics and set a new standard for independent scientific review that remains relevant as the NAM contributes to coronavirus-related policies. Vaccine confidence depends on trust in the safety and efficacy of the products themselves, trust in vaccine manufacturers and the clinicians who administer vaccines, and trust in policymakers who assess the scientific evidence and promulgate vaccination recommendations. Failures in any of these areas can have substantial long-term public health consequences, as was the case with misinformation about measles vaccines. Enduring mistrust stemming from a discredited study that associated childhood vaccination with autism has been linked to recent outbreaks of measles in the United States. Sustaining both vaccine safety and trust in vaccination will become increasingly complex. Vaccines continue to be approved, and more vaccines have become accessible in resource-limited countries, but safety surveillance systems are less evolved in many low-income regions than in high-income regions. Similarly, vaccines are being manufactured in regions where regulatory oversight isn’t always optimal, and counterfeit vaccines remain a threat. Emerging infections may require rapid availability of new vaccines before comprehensive safety studies are complete. Perhaps most important, the speed and reach of communication on social media platforms have created unprecedented opportunities for users to amplify misinformation and flame the fears of parents and other stakeholders in the immunization ecosystem. Moving forward, vaccines against a range of infectious agents will need to be developed. New and reemerging pathogens, such as SARS-CoV-2 and new influenza strains, regularly appear. Viruses that are capable of spreading by vector or airborne routes — one of the most important pandemic threats — continue to emerge. More than 1.5 million as yet unknown viruses are estimated to exist in animals worldwide, and 38 to 50% of them are candidates to spread to humans.4 Global-surveillance and virus-discovery programs are therefore important, and they may be able to predict pandemics. In 2011, the IOM commissioned the development of a strategic multiattribute ranking tool for vaccines to facilitate evaluation of new vaccine targets and help guide decisions about prioritizing vaccine-development efforts. When pandemics emerge, rapid responses are necessary. Vaccines aren’t the only available tool: passive administration of antibodies for prevention or treatment of infectious diseases has been used for many years. The Pandemic Prevention Platform program of the Defense Advanced Research Projects Agency aims to develop a new form of passive antibody protection that can slow viral epidemics starting within 60 days after identification of the pathogen and until a vaccine can be made. Thanks to new technology, the vaccine-development process is also being condensed. Experimental vaccines were developed and ready for phase 1 clinical trials in 20 months for SARS after the epidemic began in 2003 and in slightly more than 3 months for Zika virus in 2016. The response to the Covid-19 pandemic is a prime example of how rapidly new vaccines can now be designed. By the time the WHO declared Covid-19 a pandemic on March 11, 2020, at least 37 groups from biotechnology companies and academic institutions were working on vaccine candidates.5 These candidates include live attenuated, inactivated, DNA, messenger RNA, viral vector, and spike-protein–based vaccines. Less than 1 year later, the first Covid-19 vaccine-efficacy trials have now been completed, and the first vaccines are authorized for emergency use. Many approved vaccines, such as those against measles and polio, were made using attenuated or killed versions of the virus without detailed knowledge of viral pathogenesis. In contrast, current strategies for vaccine design rely on new technologies that lead to a deeper understanding of the immune system and of host–pathogen interactions. For new experimental HIV and respiratory syncytial virus (RSV) vaccines, a detailed structural understanding of antibody interactions with the HIV envelope or the RSV prefusion form of the fusion (F) protein is needed. Vaccines remain the most effective tool for preventing infectious diseases and improving global health. Remarkable progress has been made with the use of vaccines, including the eradication of smallpox and the control of childhood diseases such as measles, mumps, rubella, and polio. New insights into the functioning of the immune system on a cellular and molecular level have made possible the rapid development of new vaccines. Difficulties facing vaccinologists include predicting the type and timing of the next pandemic; developing vaccines to combat rapidly changing pathogens such as HIV-1, influenza, and multidrug-resistant bacteria; and establishing rapid-response strategies to control emerging and reemerging infectious diseases. The future holds great promise for vaccine-mediated control of global pathogens, but providing affordable access to effective vaccines for everyone who could benefit from them remains an important challenge.

#### Future pandemics cause extinction

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The recent SARS-CoV-2 pandemic, which is causing COVID 19 disease, has taught us unexpected lessons about the dangers of human extinction through highly contagious and lethal diseases. As the COVID 19 pandemic is now being controlled by various isolation measures, therapeutics and vaccines, it became clear that our current lifestyle and societal functions may not be sustainable in the long term. We now have to start thinking and planning on how to face the next dangerous pandemic, not just overcoming the one that is upon us now. Is there any evidence that even worse pandemics could strike us in the near future and threaten the existence of the human race? The answer is unequivocally yes. It is not necessary to get infected by viruses of bats, pangolins and other exotic animals that live in remote forests in order to be in danger. Creditable scientific evidence indicates that the human gut microbiota harbor billions of viruses which are capable of affecting the function of vital human organs such as the immune system, lung, brain, liver, kidney, heart etc. It is possible that the development of pathogenic variants in the gut can lead to contagious viruses which can cause pandemics, leading to destruction of vital organs, causing death or various debilitating diseases such as blindness, respiratory, liver, heart and kidney failures. These diseases could result n the complete shutdown of our civilization and probably the extinction of human race. In this essay, I will first provide a few independent pieces of scientific facts and then combine this information to come up with some (but certainly not all) hypothetical scenarios that could cause human race misery, even extinction. I hope that these scary scenarios will trigger preventative measures that could reverse or delay the projected adverse outcomes.

#### Smart cities key to make urban growth sustainable

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A large amount of land-use, environment, socio-economic, energy and transport data is generated in cities. An integrated perspective of managing and analysing such big data can answer a number of science, policy, planning, governance and business questions and support decision making in enabling a smarter environment. This paper presents a theoretical and experimental perspective on the smart cities focused big data management and analysis by proposing a cloud-based analytics service. A prototype has been designed and developed to demonstrate the effectiveness of the analytics service for big data analysis. The prototype has been implemented using Hadoop and Spark and the results are compared. The service analyses the Bristol Open data by identifying correlations between selected urban environment indicators. Experiments are performed using Hadoop and Spark and results are presented in this paper. The data pertaining to quality of life mainly crime and safety & economy and employment was analysed from the data catalogue to measure the indicators spread over years to assess positive and negative trends. Introduction ICT is becoming increasingly pervasive to urban environments and providing the necessary basis for sustainability and resilience of the smart future cities. With the rapid increase in the presence of Internet of Things (IoT) and future internet [1,2] technologies in the smart cities context [3-5], a large amount of data (a.k.a. big data) is generated, which needs to be properly managed and analysed for various applications using a structured and integrated ICT approach. Often ICT tools for a smart city deal with different application domains such as land use, transport and energy, and rarely provide an integrated information perspective to deal with sustainability and socioeconomic growth of the city. Smart cities can benefit from such information using big, and often real-time, cross-thematic data collection, processing, integration and sharing through inter-operable services deployed in a cloud environment. However, such information utilisation requires appropriate software tools, services and technologies to collect, store, analyse and visualise large amounts of data from the city environment, citizens and various departments and agencies at city scale to generate new knowledge and support decision making. The real value of such data is gained by new knowledge acquired by performing data analytics using various data mining, machine learning or statistical methods. However, the field of smart city based data analytics is quite broad, complex and is rapidly evolving. The complexity in the smart city data analytics manifests due to a variety of issues: i) Requirements of cross-thematic applications e.g. energy, transport, water, urban etc, and ii) multiple sources of data providing unstructured, semi-structured or structured data, and iii) trustworthiness of data [6,7]. In this regard, this paper provides a data oriented overview of smart cities and provides a cloud based analytical service architecture and implementation for the analysis of selected case study data. Smart cities provide a new application domain for big data analytics and relatively not much work is reported in literature. A review of the state of the art provides very promising insights about applying cloud computing resources for large scale smart city data analytics. For instance, Lu et al. [8] focus on using computational resources for large scale data for climate having complex structure and format. Using a multi scale dataset for climate data, they demonstrated a cloud based large scale data integration and analytics approach where they made use of tools such as RapidMiner and Hadoop to process the data in a hybrid cloud. Among others, the COSMOS project [9] provides a distributed on-demand cloud infrastructure based on Hadoop for analysing Big Data from social media sources. The infrastructure has the capability to process millions of data-points that would take much longer on a desktop computer. It allows social scientists to integrate and analyse data from multiple non-interoperable sources in a transparent fashion. Such a Big Data analysis platform can also be useful for smart cities as it would allow decision-makers to collect and analyse data from many sources in a timely manner. Ahuja and Moore [10] provide a state of the art review of the technologies being used for big data storage, transfer and analysis. Qin et al. [11] present challenges of Big data analytics and acknowledge the capabilities of MapReduce and RDBMS to solve these challenges. The main contribution of their work is that they have provided a unified MapReduce and RDBMS based analytic ecosystem to avail complementary advantages from both systems. Recently some studies have investigated the usefulness of data mining techniques to combine data from multiple sources such as by Moraru and Mladenic [12]. They applied Apriori technique, which is rule based data mining technique, to learn rules from data. Although they are able to extract some rules from small scale but they’re unable to learn much on large scale data due to high volume of the data and the limited memory on a single system. We use a similar approach that is based on MapReduce. Our prototype implementation analyses the Bristol open dataset to identify correlations between selected urban environment indicators such as Quality of Life. We have developed two implementations using Hadoop and Spark to compare the suitability of such infrastructures for Bristol open data analysis. The remainder of this paper is structured as follows: the next section provides background and rationale in the context of smart cities. Section “An abstract architectural design of the cloud-based big data analysis” provides a data analytics service architecture and design for analytical processing of big data for smart cities. After this, a simple use case based on Bristol open data by identifying needs of information processing and knowledge generation for decision making is presented in Section “A use case: analytics using Bristol open data”. In Section “Prototype implementation” we present the applicability of the proposed solution by implementing a MapReduce based prototype for Bristol open data and discuss outcomes. Finally, we conclude our discussion and present future research directions in Section “Conclusions and future directions”. ICT and smart cities Approximately 50% of world’s population live in urban areas, a number which is expected to increase to nearly 60% by 2030 [13]. High levels of urbanisation are even more evident in Europe where today over 70% of Europeans live in urban areas, with projections that this will increase to nearly 80% by 2030 [13,14]. A continuous increase in urban population strains the limited resources of a city, affects its resilience to the increasing demands on resources and urban governance faces ever increasing challenges. Furthermore, sustainable urban development, economic growth and management of natural resources such as energy and water require better planning and collaborative decision making at the local level. In this regard, the innovation in ICT can provide integrated information intelligence for better urban management and governance, sustainable socioeconomic growth and policy development using participatory processes [15]. Smart cities [4] use a variety of ICT solutions to deal with real life urban challenges. Some of these challenges include environmental sustainability, socioeconomic innovation, participatory governance, better public services, planning and collaborative decision-making. In addition to creating a sustainable futuristic smart infrastructure, overcoming these challenges can empower the citizens in terms of having a personal stake in the well-being and betterment of their civic life. Consequently, city administrations can get new information and knowledge that is hidden in large-scale data to provide better urban governance and management by applying these ICT solutions. Such ICT enabled solutions thus enable efficient transport planning, better water management, improved waste management, new energy efficiency strategies, new constructions and structural methods for health of buildings and effective environment and risk management policies for the citizens. Moreover, other important aspects of the urban life such as public security, air quality and pollution, public health, urban sprawl and bio-diversity loss can also benefit from these ICT solutions. ICT as prime enabler for smart cities transforms application specific data into useful information and knowledge that can help in city planning and decision-making. From the ICT perspective, the possibility of realisation of smart cities is being enabled by smarter hardware and software e.g. IoTs i.e. RFIDs, smart phones, sensor nets, smart household appliances, and capacity to manage and process large scale data using cloud computing without compromising data security and citizens privacy [16]. With the passage of time, the volume of data generated from these IoTs is bound to increase exponentially and classified as Big data [17]. In addition, cities already possess land use, transport, census and environmental monitoring data which is collected from various local, often not interconnected, sources and used by application specific systems but is rarely used as collective source of information (i.e. system of systems [18]) for urban governance and planning decisions. Many local governments are making such data available for public use as “open data” [19]. Managing such large amount of data and analysing for various applications e.g. future city models, visualisation, simulations, provision of quality public services and information to citizens and decision making becomes challenging without developing and applying appropriate tools and techniques.

#### Climate change is anthropogenic and causes extinction---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.

#### Unsustainable megacities cause extinction – litany of reasons

Cribb, 2017 (Julian Cribb, Julian Cribb is an Australian science writer, the author of nine books and over 8000 media articles. He is a Fellow of the Australian Academy of Technological Sciences and Engineering and of the Australian National University Emeritus Faculty.From 1996-2002 he was Director, National Awareness, for Australia's national science agency, CSIRO. He has received more than 30 awards for journalism including the Order of Australia Association Media Prize, the inaugural Eureka Prize for environmental journalism, the inaugural AUSTRADE award for international business journalism, the Dalgety Award for rural journalism, two MBF Awards for medical journalism and five Michael Daley Awards for science journalism., “The Urbanite (Homo urbanus),” Surviving the 21st Century, pp 147-169, Print ISBN: 978-3-319-41269-6, <https://link.springer.com/chapter/10.1007/978-3-319-41270-2_8#citeas>, accessed on 11/21/2019)

By the mid-twenty-first century the world’s cities will be home to approaching eight billion inhabitants and will carpet an area of the planet’s surface the size of China. Several megacities will have 20, 30, and even 40 million people. The largest city on Earth will be Guangzhou-Shenzen, which already has an estimated 120 million citizens crowded into in its greater metropolitan area (Vidal 2010 ). By the 2050s these colossal conurbations will absorb 4.5 trillion tonnes of fresh water for domestic, urban and industrial purposes, and consume around 75 billion tonnes of metals, materials and resources every year. Their very existence will depend on the preservation of a precarious balance between the essential resources they need for survival and growth—and the capacity of the Earth to supply them. Furthermore, they will generate equally phenomenal volumes of waste, reaching an alpine 2.2 billion tonnes by 2025 ( World Bank )—an average of six million tonnes a day—and probably doubling again by the 2050s, in line with economic demand for material goods and food. In the words of the Global Footprint Network “The global effort for sustainability will be won, or lost, in the world’s cities” (Global Footprint Network 2015 ). As we have seen in the case of food (Chap. 7), these giant cities exist on a razor’s edge, at risk of resource crises for which none of them are fully- prepared. They are potential targets for weapons of mass destruction (Chap. 4). They are humicribs for emerging pandemic diseases, breeding grounds for crime and hatcheries for unregulated advances in biotechnology, nanoscience, chemistry and artificial intelligence. Beyond all this, however, they are also the places where human minds are joining at lightspeed to share knowledge, wisdom and craft solutions to the multiple challenges we face. For good or ill, in cities is the future of civilisation written. They cradle both our hopes and fears. Urban Perils The Brazilian metropolis of Sao Paulo is a harbinger of the challenges which lie ahead for Homo urbanus, Urban Human. In a land which the New York Times once dubbed “the Saudi Arabia of water” because its rivers and lakes held an eighth of all the fresh water on the planet, Brazil’s largest and wealthiest city and its 20 million inhabitants were almost brought to their knees by a one-in-a-hundred-year drought (Romero 2015 ). It wasn’t simply a drought, however, but rather a complex interplay of factors driven by human overexploitation of the surrounding landscape, pollution of the planetary atmosphere and biosphere, corruption of officialdom, mismanagement and governance failure. In other words, the sort of mess that potentially confronts most of the world’s megacities. In the case of Sao Paulo, climate change was implicated by scientists in making a bad drought worse. This was compounded by overclearing in the Amazon basin, which is thought to have reduced local hydrological cycling so that less water was respired by forests and less rain then fell locally. Th is reduced infiltration into the landscape and inflow to river systems which land-clearing had engorged with sediment and nutrients. Rivers running through the city were rendered undrinkable from the industrial pollutants and waste dumped in them. The Sao Paulo water network leaked badly, was subject to corruption, mismanagement and pilfering bordering on pillage. Government plans to build more dams arrived 20 years too late. “Only a deluge can save São Paulo,” Vicente Andreu, the chief of Brazil’s National Water Agency (ANA) told The Economist magazine (Th e Economist 2014). Depopulation, voluntary or forced, loomed as a stark option, officials admitted. Although the drought eased in 2016, water scarcity remained a shadow over the region’s future. Sao Paulo is far from alone: many of the world’s great cities face the spectre of thirst. The same El Nino event also struck the great cities of California, leading urban planners—like others all over the world—to turn to desalination of seawater, using electricity and reverse osmosis filtration (Talbot 2014). This kneejerk response to unanticipated water scarcity echoed the Australian experience where, following the ‘Millennium Drought’ desalination plants were producing 460 gigalitres of water a year in four major cities (National Water Commission 2008)—only to be mothballed a few years later when the dry eased. By the early 2010s there were more than 17,000 desalination plants in 150 countries worldwide, churning out more than 80 gigalitres (21 billion US gallons) of water per day, according to the International Desalination Association (Brown 2015). Most of these plants were powered by fossil fuels which supply the immense amount of energy needed to push saline water through a membrane filter and remove the salt. Ironically, by releasing more carbon into the atmosphere, desalination exacerbates global warming and so helps to increase the probability of fiercer and more frequent droughts. It thus defeats its own purpose by reducing natural water supplies. A similar irony applies to the city of Los Angeles which attempted to protect its dwindling water storages from evaporation by covering them with millions of plastic balls (Howard 2015)—thus using petrochemicals in an attempt to solve a problem originally caused by … petrochemicals. These examples illustrate the ‘wicked’ character of the complex challenges now facing the world’s cities—where poorly-conceived ‘solutions’ may only land the metropolis, and the planet, in deeper trouble that it was before. This is a direct consequence of the pressure of demands from our swollen population outrunning the natural capacity of the Earth to supply them, and shortsighted or corrupt local politics leading to ‘bandaid’ solutions that don’t work or cause more trouble in the long run. Other forms of increasing urban vulnerability include: storm damage, sea level rise, flooding and fire resulting from climate change or geotectonic forces; governance failure, civic unrest and civil war exemplified in Lebanon, Iraq and Syria over the 2010s; disruption of oil supplies and consequent failure of food supplies; worsening urban health problems due to the rapid spread of pandemic diseases and industrial pollution and still ill-defined but real threats posed by the rise of machine intelligence and nanoscience (Gencer 2013). The issue was highlighted early in the present millennium by UN Secretary General Kofi Annan, who wrote: Communities will always face natural hazards, but today’s disasters are often generated by, or at least exacerbated by, human activities… At no time in human history have so many people lived in cities clustered around seismically active areas. Destitution and demographic pressure have led more people than ever before to live in flood plains or in areas prone to landslides. Poor land-use planning; environmental management; and a lack of regulatory mechanisms both increase the risk and exacerbate the effects of disasters (Annan 2003). These factors are a warning sign for the real possibility of megacity collapses within coming decades. With the universal spread of smart phones, the consequences will be vividly displayed in real time on news bulletins and social media. Unlike historic calamities, the whole world will have a virtual ringside seat as future urban nightmares unfold.

### Solvency

#### Plan: The United States Federal Government should substantially increase its prohibitions on anticompetitive business practices by expanding the scope of its core antitrust laws to include nascent competitors by lowering HSRA filing requirements by establishing that it is a per se violation for companies to own significant portions of market data and fail to open their data for computational antitrust auditability in a data trust.

#### Plan allows proactive antitrust, simplifies merger analysis, and helps protect consumers

**Carey 21, [**Maura Carey is an academic outreach chair of the Stanford Computational Antitrust Project. “The Computational Antitrust Project” American Bar Association, April 05, <https://www.americanbar.org/groups/business_law/publications/committee_newsletters/legal_analytics/2021/202104/fa_2/>] //Aryan

Technology has led to an explosion in the volume of data that antitrust regulators need to process in order to enforce antitrust laws. Legal practitioners in other fields are already seeing how computational techniques like information visualization, natural language processing, deep learning simulations, and machine learning can enhance their work.

The Computational Antitrust Project at the Stanford Codex Center seeks to develop ways to help antitrust enforcers, policymakers, and firms subject to antitrust harness the power of legal informatics. The Project brings together over 50 agencies from around the world and 35 leading academics in economics, law, and computer science to foster the automation of antitrust procedures and improve antitrust analysis.

Legal informatics are not intended to replace human value judgments and decision-making processes as the primary mode of economic regulation. Rather, computational tools can empower regulators and practitioners to conduct the kind of analysis necessary to apply existing antitrust frameworks to the 21st century economy. The Stanford Computational Antitrust Project is bringing together technologists, legal scholars, and economists to think creatively about how to equip agencies with the tools they need to bring global antitrust enforcement into the digital world. Legal informatics will prove especially helpful in three areas of antitrust law: anticompetitive practices, merger control, and the design and monitoring of antitrust policies.

First, computational antitrust can help antitrust agencies shift to a proactive model of policing anti-competitive practices. Antitrust agencies today often rely on reactive methods of identifying anti-competitive practices like leniency applications. **Blockchain-based**

**smart contracts and algorithmic pricing mechanisms have made it easier for companies to implement and sustain collusive agreements—making reactive methods far less effective.** Natural language **processing technology can boost antitrust agencies’ ability to detect patterns that suggest illegal intent.**

Second, computational antitrust can make it easier for agencies to assess the legality of a merger when confronted with millions of documents to review and a limited time in which to review them. Agencies can use also **computational tools to create dynamic models to better predict the competitive effects of proposed mergers**.  Computational tools can also help **address information asymmetries in the merger review process by allowing agencies and companies to share data in real time**. Blockchain technology could facilitate this data-sharing by creating immutable databases that both enforcers and firms can trust.

Finally, computational techniques can help agencies learn from past decisions and design new approaches based on those lessons. Computational models can help agencies analyze the impact of different enforcement mechanisms, understand dynamics in specific industries, and estimate consumer savings from different policy approaches. Agencies can also use these tools to systematically audit the effectiveness of their own internal processes.

Robust antitrust enforcement is essential to promoting resilient, competitive markets, and to making sure that all market participants can compete on a level playing field. Technology has revolutionized the way by which firms do business throughout the world. The Stanford Computational Antitrust Project is dedicated to ensuring that antitrust enforcement can keep up with the rapid pace of chance.

#### Comp antitrust addresses judicial ineptitudes with pattern recognition

CodeX ‘21. TRANSCRIPT. Computational Antitrust First Annual Conference: Exploring Antitrust 3.0 On December 13, 14, and 15, 2021, The Stanford Center for Legal Informatics (CodeX). <https://law.stanford.edu/wp-content/uploads/2022/02/first-annual-conference-transcript.pdf>. This section is Daryl Lim speaking. /// Anekah

Computational Antitrust brings together the maximum precision of artificial intelligence to address Chicago and fears of judicial ineptitude and false positives. The age-old tension between dynamic and static efficiency that informs everything from killer acquisitions in the not-too-distant past to antitrust in the Metaverse in the not-too-distant future is where I think computational antitrust can do its role in everything from detection, to assessment, to investigation, to recommending whether to launch an investigation, to prosecution, to adjudication, [and] to the implementation of remedies. And let me just give you four quick examples. First, with detection, natural language processing can analyze consumer complaints and media reports with antitrust potential. To use a facetious example, say you saw tens of thousands of people amassing together, and you’re trying to figure out what was going on. So, you go to their leader. He denies there’s anything untoward, but your algorithm picks up that he had lamented about the disintegration of a hegemonic Empire he was part of and describes how he was affected personally by the tough economic times that followed the collapse of when his country suffered double-digit inflation. He says to you, “sometimes I had to moonlight and drive a taxi.” It’s unpleasant to talk about it. But unfortunately, this also took place, and then you realize this is probably more than a group of enthusiasts. In the same way, artificial intelligence can learn and analyze language patterns and tones of informants that applied for antitrust leniency. With respect to adjudication, computational antitrust can scour reported cases to assess how past courts weigh competitive effects and identify influential factors. Some factors may be conventional; others may be previously unobserved. For example, algorithms could scour cases and match them against depositions and other preprocessed evidence to provide a more quick and consistent analysis. So, whether you’re talking about big data, deep learning, data mining, that can help to identify relevant market variables, even in the absence of an established theory. More broadly, you can detect connections without the current legal significance that parties do not know or have no capacity to examine. Algorithms can also account for interactions about the indicators that escape expert witnesses, contextualize and associate information with the familiar and provide predictions based on entering parameters. Eventually, this will coalesce to create per se rules of illegality or legality or find more appropriate cases for burden-shifting under the quick look approach. Courts have devised per se rules, for example, by using the damning presence of an agreement to fix prices as a sign of market inefficiency. There’s no need then to engage in a counterfactual exercise giving defendants no opportunity to prove the value of those restraints. A judge’s unfamiliarity of the industry at issue will then become of less importance, less of an impediment as they will be able to apply precedent across industries and, in fact, in the Supreme Court words, establish one uniform rule applicable to all industries alike. So indeed, far from a reason not to apply the per se rule, a judge’s lack of experience in the industry is precisely the reason why they should do so, and computational antitrust can provide a reasoned, evidence-based approach. To do that, of course, the opposite could happen, and you could eliminate per se rules if computational antitrust determines that these are not manifestly anticompetitive or procompetitive effects. To build up a database, algorithms can creep and mine reports on Westlaw. In fact, if you look at Westlaw, this year, they have unveiled a quick check document analysis tool that identifies patterns and connections that users do not detect. And it enables judges and attorneys to determine the merits of a case efficiently. Importantly, the results from the AI recommendations are there to challenge prior assumptions to provide a check against what behavioral scientists called coherence-based reasoning. Because research shows that confronting people with the merits of the opposite side reduces the effects of these coherence biases by about 50%. Third, with recommendations, AI can also predict the impact of things like killer acquisitions by running simulations to determine the optimal contestability conditions and better map synergies that help innovation pathways by tracing the user adoption of technology and Thibault mentioned my paper, where you can look at that for more detail and discussion. Fourth, in exploring counterfactuals and crafting remedies, AI-enabled antitrust can also maximize a preset reward. And in the paper, I also talked about that. Now, the point is, how do we know if computational antitrust has met the great? Well, one is you should have a robust data set. And with data set, there’s always that concern about bias. But my response is that algorithms do operate in a black box, but so do judges. And even that general trend of judges engaging in post hoc reasoning is well documented and discussed. In contrast, AI provides a more objective anchor to the rule or rule of reason or some other formulation in the face of coherence-based reasoning. And if you are seeking transparency, you might find accountability instead to be a more realistic and helpful goal. And recognize that case law only provides a starting point because the precedent may or may not be based on sound economic analysis and, as I mentioned, ideology. But what happens is judges that are adjudicating life cases can compare the model’s prediction with the ground truth and adjust the model’s parameters, minimizing the error between those two values over time, and eventually, the parameters of the model will be sufficiently fine-tuned. And remember that perfect is the enemy of the good. It is progress, not perfection that we seek.

#### Auditability and a data trust inhibits anti-competitive practices and allows data science and sharing

**Mahari et al 21**-[Mahari, Graduate student, Human Dynamics Group, MIT Media Lab and JD Candidate, Harvard Law School; Lera, Assistant professor at the Shenzhen-based ETH Zurich-SUSTech Risks-X Institute and visiting researcher at MIT Connection Science and Human Dynamics;Pentland, Professor at Massachusetts Institute of Technology, Director of Connection Science and Human Dynamics, MIT Media Laboratory, Sloan School, and Institute for Data Systems and Society] //Aryan

B – Disincentivizing Data Control As discussed in Part II, we view control over data in a given market to be analogous to monopoly power. However, certain types of data and certain approaches to storing and utilizing data are more likely to undermine competition than others. The most problematic type of data control is direct ownership of data that is difficult for competitors to obtain or use and which can be used to create barriers to competition. When a company owns data outright, it is difficult to ascertain whether the data is used to lessen competition. When this data is not available to any competitors, then the likelihood that it might be used to undermine competition is especially high. Data trusts represent a relatively new approach to storing and utilizing data that reduces the probability of data misuses (not only in the context of antitrust) while facilitating auditability.42 Put simply, a data trust is a third-party entity that controls data while allowing other entities to extract insights from it. Crucially, data trusts create transparency by allowing the use of data to be audited. Through new computational techniques such as federated learning, a data trust could control data and allow outside entities to derive insights without ever sharing the raw data. In our view, companies that control a significant portion of relevant data in a market but chose to silo it in an auditable data trust that is open for business with competitors should be presumed not to use the data to gain monopoly power,43 provided they allow relevant regulatory agencies to audit data use. This solution does not deprive companies of the ability to use data science to gain legitimate business advantage, but it creates accountability and transparency while generally discouraging anticompetitive behavior.

#### Antitrust is a key testing ground for government AI adoption

Massarotto, 21 -- University of Iowa business professor

[Giovanna, international expert on antitrust law and economic regulation in the field of information technology, affiliate of the UCL Centre for Blockchain Technologies, and Ashwin Ittoo, University of Liege professor, Machine Learning, Natural Language Processing (NLP) specialist, “Gleaning Insight from Antitrust Cases Using Machine Learning,” Stanford Computational Antitrust, Vol 1., 2021, https://law.stanford.edu/wp-content/uploads/2021/03/Computational-Antitrust-Article-2-Gleaning-Insight-1.pdf, accessed 7-3-21]

The 2020s have seen vast increases in investment and interest in AI and the data industry. Data is creating a variety of new opportunities for businesses, transforming markets with faster and more sophisticated technologies, including machine learning algorithms. These new data-driven markets, in turn, create new challenges for government agencies.5

Antitrust agencies are in the spotlight because they are charged with identifying and reducing monopolistic and collusive practices in cutting edge markets, where such practices might occur at scale through algorithms (e.g. algorithmic collusion).6 A question the antitrust community is asking is whether antitrust agencies are equipped with the right tools and powers to tackle the present challenges in such a fast-moving technological environment.7 Our study aims to respond to this question by building and testing an ML antitrust algorithm.

Before diving into the explanation of our ML antitrust algorithm developed in Part III, it is helpful to clarify why we focused on FTC enforcement actions, and why antitrust can be a good testing ground for future AI applications in the regulatory domain. This evaluation requires having a brief background on the role of antitrust economic regulation and the main AI techniques available.

A - Antitrust

i. Antitrust Economic Regulation

U.S. antitrust enforcement action is primarily economic in nature because it occurs mostly outside of courts and it is explicitly grounded in economics.8 In the U.S., “over the last three decades the Agencies [DOJ and FTC] have resolved nearly their entire civil enforcement docket by consent decrees.”9 Specifically, more than ninety percent of civil antitrust lawsuits filed by the U.S. government (excluding mergers) are settled by means of an agreement.10 This consent solution puts in place remedies agreed on by the company under investigation and the agency before or during a trial. The wide adoption of consent decrees results in a regime of minimal case law," leaving the same antitrust agencies and companies to regulate markets through agreed remedies enshrined in a consent decision.12 Unlike the DOJ, the FTC can settle proceedings without the need for adjudication by a court.'3 Consent decrees identify certain behavioral or structural remedies based on economic analysis, which de facto imposes an economic regulatory regime.'4

Because antitrust agencies are empowered to enforce competition principles in any market, antitrust is often the first type of regulation to reach a new market.'5 For example, while the Federal Communication Commission (FCC) has the authority and duty to regulate the telecommunications industry specifically,'6 the FTC, through Section 5 of the FTC Act, may exercise wide discretion in regulating markets generally.'7 As a result, antitrust may be considered the “first arm” of government regulation because it reaches new markets for which Congress has yet to draft a more specific regulatory scheme.

In summary, FTC antitrust enforcement mechanisms resemble economic regulation because, as outlined above, the FTC enforcement action occurs mostly outside of courts and its decisions are grounded in economics. Economic concepts drive decisions on what the FTC considers anticompetitive conduct as well as the types of antitrust remedies to adopt.

2. The FTC and Section 5 of the FTC Act

In contrast to the DOJ Antitrust Division, which represents the U.S. in criminal as well as civil antitrust cases and traditionally plays a prosecuting role, the FTC is an administrative agency with regulatory powers in addition to its prosecutorial powers.'8 Our study specifically focuses on FTC antitrust enforcement action under Section 5 of the FTC Act, because the FTC is the only agency with authority to enforce the FTC Act and it is not technically in charge of enforcing the Sherman Act.'9

According to Section 5, the FTC has exclusive authority to regulate “unfair methods of competition ... and unfair or deceptive acts or practices,”20 preventing individuals, partnerships, or corporations from unfairly disrupting competitive markets.21 In other words, Section 5 grants the FTC a wide range of discretion in controlling and regulating markets generally.22 Since there are almost no litigated Section 5 cases,25 our ML algorithm was trained mainly on regulatory settlements, known as consent decrees.

The structure and powers of the FTC resemble those of many antitrust agencies all over the world. EU National Antitrust agencies are mostly administrative agencies with similar powers, although they generally enjoy less open-ended delegations of power than does the FTC. Therefore, the same or similar AI techniques that have been applied in building the ML algorithm at hand are likely to be helpful for many other agencies across the world.

B - AI - Primary Concepts

We now provide a brief overview of the primary AI concepts relevant for our AML algorithm. In particular, we provide an overview of ML and the main approaches and techniques available in the learning process. The following discussion is limited to the main concepts and terminology relevant to the construction of our AML model.

1. Machine Learning

Today, ML is the main AI paradigm for a wide variety of applications, such as speech recognition (Alexa or Siri) or machine translation (Google Translate). ML algorithms enable machines to learn how to perform a task, such as playing chess or translating text, through experience. Experience here manifests itself from large volumes of data, annotated or labeled with some information of interest (e.g., credit risk score). Models are trained on the data and subsequently used to make predictions concerning the information of interest.24 Deep Learning (DL) is a specific form of machine learning, relying solely on complex neural network architectures.25

There are three main ML approaches: I) supervised learning (SL); 2) unsupervised learning (UL); and 3) reinforcement learning (RL). Below, we describe only the SL and UL paradigms as they adopt completely opposite learning procedures, and our proposed method is based on UL. The comparison between SL and UL better explains our motivation in opting for the method described in Part III.B.26

2. Supervised Leaning (SL)

In SL, an algorithm is presented with huge volumes of example data collected from the past. These data will consist of a number of variables (e.g., age, education level, salary) as well as a label, which corresponds to the information of interest (e.g., credit risk level).

The peculiarity of SL is its requirement for large volumes of training data, annotated with the label of interest. There are several different types of SL algorithms, such as random forests, neural networks, and support vector machines. These algorithms differ in the way in which they learn the relationships between variables.

). Unsupervised Leaning (UL)

Unlike SL and RL methods, Unsupervised Learning (UL) algorithms are generally not concerned with learning how to perform specific tasks. As such, there is neither a training phase in which the algorithms learn from past annotated data nor an exploration phase in which they explore their environments to determine an optimal action sequence to maximize specific rewards. Indeed, UL algorithms operate without any type of supervision or external reward signal. The main aims in UL are to discover latent structures and extract rules or associations from data, without any prior training or exploration phases. That is, the algorithms operate completely on their own (in an “unsupervised” manner). Whereas SL algorithms typically try to predict outcomes, UL algorithms are typically used to describe data.

The approach we have adopted in our algorithm is known as clustering, which identifies latent structures within a dataset and involves estimating the similarity between various data points and grouping similar data points into clusters. Clustering is widely adopted in marketing in order to identify groups of consumers with similar price or product preferences. The similarity between data points is often estimated by first projecting these data points as vectors in a multidimensional space and then computing the distance between them using measures like Euclidean distance. Subsequently, data points that are found to be close to each other (based on the computed distance) are grouped into clusters.

Several clustering algorithms exist, including K-means and bisecting K-Means (both partitional) and divisive and agglomerative methods (both hierarchical), all of which we have applied to our AML model. Clustering algorithms will be described in more detail in Part III.B.

C - Why Antitrust and AI?

Having clarified the role and powers of the FTC within the U.S. antitrust law enforcement framework and the main AI techniques relevant for our project, we now explain why AI techniques may be relevant to antitrust enforcement.

As already mentioned, AI algorithms have been applied to other areas of law enforcement unsuccessfully, causing some to question the usefulness of AI in the law. For example, Compas is an algorithm employed in the U.S. legal system with the aim to make judicial decisionmaking more efficient. Compas was trained to assist judges in Florida in deciding whether a defendant was likely to re-offend27 and should remain in jail or be released while the trial was pending.28 However, the algorithm showed a clear bias. According to a study conducted by Propublica, “defendants predicted to re-offend who actually did not were disproportionately black.”29 This algorithm exhibits the risks related to the adoption of AI techniques, which can lead to bias at scale if the algorithm is not correctly built and trained.

Despite initial skepticism of the utility of AI applied to law enforcement, as observed in Part II.A.i, FTC antitrust enforcement resembles economic regulation, which means it is neither a law nor best practice, but “the pattern of government intervention in the market”30 designed to achieve market efficiency.3' Therefore, antitrust enforcement might serve as a safer testing ground for the exploitation of AI techniques in future regulatory interventions based on economic reasoning and goals rather than on protecting human rights. In this way, government agencies can potentially gain in efficiency and companies can have a better understanding of what constitutes an anticompetitive practice.

## 2AC

### Data/AI

#### Leadership is sustainable---multipolarity’s not inevitable

Michael E. O'Hanlon 10/28, Director of Research - Foreign Policy Co-Director - Center for Security, Strategy, and Technology, Africa Security Initiative Senior Fellow - Foreign Policy, Center for Security, Strategy, and Technology The Sydney Stein, Jr. Chair, “China is definitely on the rise. But don’t write off American dominance just yet.,” Brookings, 10-28-2021, https://www.brookings.edu/blog/order-from-chaos/2021/10/28/china-is-definitely-on-the-rise-but-dont-write-off-american-dominance-just-yet/

China is definitely on the rise. But don’t write off American dominance just yet.

Even if the trade wars between the United States and China that dominated the Trump era have receded slightly, many other issues have intensified.

China tested a hypersonic and potentially globe-spanning weapon this summer. It conducted dozens of sorties by combat aircraft that touched on Taiwan’s Air Defense Identification zone and otherwise menaced the island of 23 million (plus much of the world’s semiconductor production capacity) that it claims as its own. The Pentagon’s artificial intelligence guru, Nicolas Chaillan, recently resigned with a warning that the United States is losing the AI race to China. Intelligence and military officials warn that China may be expanding its nuclear arsenal by up to several hundred warheads. And commanders of U.S. Indo-Pacific Command in Hawaii have estimated that China might well attempt to take Taiwan within a half-dozen years or so, given its military modernization trends.

We should not overreact to these troubling trends. They are serious. They are, however, far from truly foreboding.

China is flexing its muscles more than preparing for war; this is not the equivalent of Europe in the late 1930s, given how much China depends on a stable international order for its continued success. We do need to stay vigilant, remember the art of war even in this age of (relative) peace, and expand our economic as well as military toolkit for crisis management. We need not and must not panic, however, because doing so could turn manageable crises into truly scary ones.

CHINA WON’T TAKE THE RISK

First, let’s remember America’s many strengths. Our military budget is about three times’ China’s, and our allies in Europe and East Asia together outspend China themselves (even if not all would fight in a war in the Pacific, admittedly).

The loose coalition of European nations and the U.S. also represents the consumer market of more than a billion comparatively wealthy individuals whom China needs in order to sustain its still-export-driven economy. That means we have many tools of economic, as well as military, warfare if needed.

Since 1945, seven Democratic and seven Republican U.S. presidents have collectively upheld a rules-based international order that has established a very strong norm against interstate aggression, making any Chinese attack on Taiwan hugely problematic for President Xi Jinping and his fellow leaders in Beijing.

The world’s response to an actual attack against Taiwan — and this is the scenario that is truly the most worrisome for its potential to shake world peace — would likely be rather unified and strong. China knows it. For this reason, I believe that U.S. Indo-Pacific Command and other parts of the government need to be careful and restrained with their rhetoric (as most but not all are). China may have growing capacity to attempt to seize Taiwan, but it knows that actually making the attempt would be a cosmic roll of the dice, to be attempted only under the most extreme of circumstances.

AMERICA’S OPTIONS AGAINST CHINA

Beyond these broad advantages are a number of specific factors working in our favor to direct China’s rise in a generally peaceful direction:

Even if our AI efforts, at the Pentagon and elsewhere, could be better focused, we enjoy numerous advantages in high technology vis-à-vis China, including in stealth, submarine technology, and long-range strike platforms like aircraft carriers. Even if China’s military is bigger than ours in some ways — total troop count, total ship count — ours is much better (and battle-hardened). Also, just to take one frequently misused statistic, if China’s navy has more ships than ours, we have a fleet with larger vessels, meaning the U.S. Navy wields twice the total ship tonnage, based on calculations my colleagues and I have done.

Every time China fortifies another artificial island, should it continue down that path, we can respond. We can add bases in the Indo-Pacific region ourselves, or tighten various security partnerships, as with India. We should do this with restraint, and proportionality, to be sure — but the bottom line is that the United States has lots of allies and China does not. We also have a globally capable military that can, for example, continue to uphold our access to the South China Sea even when Beijing wrongly and dangerously claims it as territorial waters.

If China does attack Taiwan, with the goal of reunification, I believe it is far more likely to attempt a blockade (combined with cyberattacks) than an outright invasion. Moving big ships near the coasts of a vigilant adversary is very hard to do in the era of precision-strike weaponry and advanced mines. In a blockade scenario, we have other options besides fighting right next to Taiwan — we can, for example, use economic warfare backed up by our military to interfere with China’s access to oil and other commodities coming from the Persian Gulf and Africa.

MANAGING CHINA’S RISE

To be sure, the United States needs to stay vigilant — and to keep getting “stronger” ourselves, as Brookings Institution scholar Ryan Hass argues in a new book of that very title. Our military command and control must be more resilient in order to makes sure our “kill chain” is robust. Our armed forces need more long-range strike platforms, including more bombers and long-range unmanned systems operating off aircraft carriers and attack submarines, given China’s ability to threaten nearby U.S. bases.

Nations need to diversify and harden their economies, and the global supply chains that undergird them, so that China does not have the upper hand in any future economic warfare scenarios.

Managing China’s rise is going to be a challenge for America and her allies for a generation. But if we stay calm in crises, and make ourselves stronger and more resilient militarily and economically, we should have the tools needed to sustain the peace.

#### Non-unique---restraint’s impossible.

Christopher Layne 19, University Distinguished Professor of International Affairs, and, Robert M. Gates Chair in National Security, at Texas A&M University. His fields of interest are international relations theory, great power politics, US foreign policy, and grand strategy. September 23. "Roundtable 11-2 on The Great Delusion: Liberal Dreams and International Realities" <https://issforum.org/roundtables/11-2-delusion>

Outstanding books on controversial topics invariably provoke debate. The Great Delusion will be no exception. Although I am broadly sympathetic with Mearsheimer’s critique of liberalism as a theory of IR, and as a driver of American foreign policy, his argument can be questioned on several grounds. First, his explanation of ‘liberal hegemony’ is not on solid ground historically. Second, if anything, Mearsheimer understates the pervasive, deep-seated influence that liberalism exercises on American foreign policy. It is far from clear that a liberal America can ever adopt a grand strategy of restraint (whether it is denominated as offshore balancing, strategic independence, or, strategic self-discipline) Third, although Mearsheimer does an excellent job of demonstrating how the democratic peace theory actually spawns regime change wars, he overlooks the fact that economic openness is an important cause of U.S. ‘imperial overstretch,’—and, sometimes, war.[12] Fourth, although we both are realists, and students of great power politics, I am troubled by the China policy Mearsheimer advocates in The Great Delusion.

In Mearsheimer’s view, liberal great powers can only pursue liberal hegemony in a unipolar system. When the international system is bipolar or multipolar, he says (vii, 2, 139-140), a liberal great power must place the imperatives of realpolitik and state survival ahead of its ideological ambitions: “A liberal great power operating in either bipolarity of multipolarity cannot pursue liberal hegemony because of the presence of other great powers” (139-140). In his telling, therefore, liberalism did not take over American foreign policy until the end of the Cold War, and the so-called Unipolar Moment.[13] This is because, he claims, until the Soviet Union collapsed the realist imperatives of the great-power competition with Moscow prevented the United States from pursuing liberal hegemony.

In fact, however, the United States embarked on a policy of liberal hegemony in the early twentieth century—that is, well before the advent of unipolarity. It is America’s liberal political culture and ideology—not systemic polarity—that has been the primary driver of the U.S. quest for liberal hegemony. Liberal hegemony has been America’s overriding grand strategic objective for over a century. This has important implications for the future. All those who advocate some form of U.S. grand strategic restraint must come to terms with the continuity in America’s grand strategic aims—a reflection of the fact that the nation’s political culture is interwoven with liberal beliefs. When we understand how long liberalism has been a driving force behind U.S. grand strategy, the magnitude of the task that restrainers face in trying to reorient American foreign policy becomes clear.

Mearsheimer argues that when the Soviet Union imploded, the United States “was so powerful in the aftermath of the Cold War that it could adopt a profoundly liberal foreign policy, commonly referred to as ‘liberal hegemony.’ The aim of this ambitious strategy is to turn as many states as possible into liberal democracies while also fostering an open international economy and building formidable international institutions. In essence, the United States has sought to remake the world in its own image” (vii). For sure, following the Cold War’s end the George H.W. Bush, Bill Clinton, and George W. Bush administrations pursued an ambitious set of liberal foreign policy aims. This was nicely captured in the title of the Clinton administration’s National Security Strategy of Engagement and Enlargement (enlargement refereeing to the expansion both of NATO, and the ‘democratic zone of peace’). During this era, leading scholars like John Ikenberry advocated for a post-Cold War policy of liberal hegemony, while neo-conservatives simultaneously called for the creation of a “new” American empire that muscularly would promote liberal values abroad.[14] Clearly, the post-1989 unipolar world fueled the international ambition of America’s foreign policy elite.

However, few students of American diplomatic history would agree with the argument that the post-1989 saliency of liberal ambitions, or even the pursuit of liberal hegemony, constituted a new direction in American foreign policy. The intellectual origins of liberal hegemony—which fuses liberal political philosophy, the evangelizing spirit of Protestantism, notions about American Exceptionalism, and conceptions about American identity (‘the un-Europe’)—are deeply rooted in American political culture and trace back to the colonial era.[15] Until the end of the nineteenth century the melding of these forces propelled America’s expansion across the North American continent. As the twentieth century dawned, the reach of the America’s ideological and geopolitical ambitions expanded dramatically as the U.S. sought to export liberalism abroad. This outward thrust is unsurprising: as rising great powers acquire more economic and military muscle, their international ambitions grow.[16]

America was well down the road to liberal hegemony long before the end of the Cold War, and the advent of unipolarity. Here, Mearsheimer’s own previous work provides a clue as to why the United States was able to pursue liberal hegemony under conditions of both multipolarity (1900 to 1945), and bipolarity (1945 to 1989). In The Tragedy of Great Power Politics, he introduced the concept of ‘unbalanced’ multipolarity: a system of multiple great powers but one where the relative power of one of them is appreciably greater than that of the others.

President Woodrow Wilson was able to pursue liberal hegemony because, even if the international system was nominally multipolar, during World War I and its aftermath, the United States was incontestably the strongest great power in the system. Indeed, the historian Adam Tooze suggests that at the end of World War I, the historic Europe-centric international system of multiple great powers (multipolarity) already was on the verge of being displaced by a unipolar system dominated by the United States: “The one nation that emerged apparently unscathed and vastly more powerful from the war was the United States. Indeed, so overwhelming was its pre-eminence that it seemed to raise once more the question that had been expelled from the history of Europe in the seventeenth century. Was the Unite Stated the universal, world-encompassing empire similar to the one which the Catholic Hapsburgs had once threatened to establish? The question would haunt the century that followed.”[17]

What was incipient in the period from 1917 to 1920 was reality when World War II ended. 1945 was America’s first unipolar moment. The United States was, as Paul Kennedy, observed “the only country that became richer—in fact, much richer—rather than poorer because of the war.”[18] And Robert Gilpin has noted, “In terms of absolute power, the United States, in 1945, greatly surpassed the rest of the world. In addition to her vast industrial capacity, the U.S. virtually monopolized or controlled the three sources of power in the modern world: nuclear weapons, monetary reserves, and petroleum. She alone had the atomic bomb and the knowledge to produce what at the time was called the absolute weapon. American factories produced over 50 percent of the world’s output, and America held approximately 50 percent of the world’s monetary reserves.”[19] It was America’s commanding power at World War II’s end that allowed it to build the postwar liberal order—which, though fraying, is still in place today—based on democracy, economic openness, and interlocking security and economic institutions (NATO, the United Nations, the International Monetary Fund, the United Nations, the World Bank, and the World Trade Organization).[20] At a time when the future of the post-1945 “liberal rules based international order’ is a topic of intense speculation, it is a bit jarring to be told by Mearsheimer that United States was only able to pursue liberal hegemony after 1989.[21]

### Neolib K

#### We should combine short-term problem-solving theory with larger critical questioning of the framework for action.

Wesley **WIDMAIER** Poli Sci @ St. Joseph’s **‘4** “Theory as a Factor and the Theorist as an Actor: The "Pragmatist Constructivist" Lessons of John Dewey and John Kenneth Galbraith” *International Studies Review* p. 445

In recent decades, the "research design"-style structuring of questions and cases has come at the expense of such constitutional concerns. Certainly, scholarly efforts should not be evaluated exclusively in terms of the "correctness" of their policy views. Academia would not "work" if subjective political differences became legitimate grounds for dismissing arguments. However, scholars need to acknowledge that their views inevitably possess normative and policy implications rather than pretending that such implications do not exist. Consider again that despite their numerous differences, the constitutive lessons inherent in the analyses of Waltz, Cox, Ashley, and Campbell are quite similar: that state and societal agents must define their interests in competitive—as opposed to collective—fashion. One suspects that this is not the "moral" that Ashley or Campbell sought to advocate. Unfortunately, the absence of a broader focus on such constitutive "lessons," a neglect rooted in the structure of IR debate itself, limited their attention to such issues. In contrast, by more persistently asking questions about the constitutive effects of theoretical or empirical claims, scholars may enable a more relevant study of international relations. They might reclaim the public space to act as not simply "academics" in the narrow sense of the term—within elite epistemic communities or as participant-advisors in the policy process—but rather they might aid one another in functioning as public intellectuals, focusing larger public debates in a more constructive, pragmatic manner. What are the potential benefits of such shifts? The resulting academic contribution to public policy learning might enable not simply materialist-rationalist styled Bayesian probability updating (Iverson 1984), but rather could promote a kind of "social learning." Such learning, as Albert Bandura (1962, viii) has argued "neither casts people into the role of powerless objects controlled by environmental forces nor free agents who can become whatever they choose," but rather recognizes that "both people and their environments are reciprocal determinants of each other." Such social learning requires an ability to "make sense" of intersubjective contexts through a broader dialogue among the public, scholars, and policy agents. International structures, from this vantage, offer no unambiguous lessons. Contrary to Kissinger's (1979:54–55) view (noted earlier) that "the convictions that leaders have formed before reaching high office are the intellectual capital they will consume as long as they continue in office," possibilities for intersubjective variation require a constant monitoring of the prevailing intersubjective "mood." Just as balance of power rules are learned in a social context, they can be unlearned if states come to expect cooperation instead of conflict. Kissinger-like claims regarding the irrelevance of ongoing reflection to policymaking seem misguided, as does the application of "balance of power" lessons in an inappropriate social context that may, in turn, contribute to new policy errors. Put simply, lessons that are applicable in one setting (for example, Europe in 1914) may be counterproductive in another (for example, Europe in 1992). Such variation might, perhaps, be more readily recognized by scholars engaged in a more pragmatic, ongoing social learning. Conclusion Theory constitutes social reality. This realization highlights the need for a pragmatist-constructivist approach to IR theory, one that involves an ongoing involvement in both scholarly and public debates. Unfortunately, the development of such a perspective in IR scholarship has often been impededby the distinction between "long-term" critical theory and "short-run" problem-solving theory. The present essay has called this distinction into question by describing the ways in which John Dewey and John Kenneth Galbraith engaged in theoretical debates while also pursuing policy agendas. Both Dewey and Galbraith highlighted the importance of socially constructed understandings in the issue areas of education and economic policy. More broadly, their work itself provided a better sense of what it means to act as a public intellectual in both guiding and being immersed in public debates. In addressing the implications for IR scholarship, this essay has, therefore, urged a more explicit stress on both the role of agency in advancing change and a recognition of the constitutive effects of theory on social reality. In keeping with the tradition of pragmatist scholarship, let us conclude that distinctions between critical theory and problem-solving theory need to be relaxed considerably to highlight the potential roles of theory as a factor as well as of theorists themselves as actors in international politics (Edwards 1990).

#### Comparing “competing political imaginaries” requires specific alternatives to existing economic methods. Failure to specifically explain an alternative crushes hope for transition.

Andrew **SAYER** Reader in Political Economy @ Lancaster **’95** *Radical Political Economy: A Critique* p. 7-8

Radical political economy is of course a critical social science, both explaining and criticizing the practices it studies, with the explicit aim of reducing illusion and freeing people from domination and unwanted forces. But it can only hope to have an emancipatory effect if it considers its own critical standpoints and the alternative social arrangements they imply. Unfortunately it rarely does this, with the result that its stand- points and implicit alternatives are often contradictory, infeasible, or undesirable even if they are feasible. Marxist-influenced work still bears the traces of the tension between the standpoints of a socialist or communist society which has pre-industrial communitarian qualities and one in which the forces of production are developed beyond current levels of industrialization. More generally, there is a strong modernist tendency in which it is assumed that problems can be progressively unravelled without creating new ones at the same time, as if eventually all trade-offs or dilemmas could be overcome through a triumph of reason. We shall argue through substantive examples that such optimism is not only misplaced but likely to be counterproductive, limiting progress. There are always likely to be 'dilemmas of development' (Toye, 1987. The problem of critical standpoints has become more acute in recent years, indeed it is central to the crisis of the Left. There is no longer asingle standpoint or alternative (socialism/communism) counterposed to a single, overarching target (capitalism). Now there are many targets -patriarchy, racism, homophobia, militarism, industrialism - and corre- spondingly many critical standpoints with complex relations between them. That critical social science is no longer seen as synonymous with a socialist perspective is a sign of considerable progress, and cause for optimism too, as failure on the traditional front of class politics is compensated by progress on other, newer fronts such as the politics of gender. But it is also a source of heightened uncertainty. While there was always a problem of inconsistencies between critical standpoints, it has deepened and widened with the rise of 'green' concerns, for they bring into question the feasibility and desirability of non-capitalist as well as capitalist industrial societies. Is the problem capitalism, industrial society in general, or modernity?; and what are the alterna- tives? Equally, increasing awareness of problems of ethnocentrism and value pluralism throws doubt over the familiar, implicit critical stand- points of Western radical social science. How do we decide what is a problem? What if we cannot reach a consensus on this? Until recently, it seemed that the problems or targets of critical social science could be relied upon to emerge from the investigation of existing practices, where one would encounter the felt needs, frustrations and suffering of actors, and in discovering the sources of these problems, work out what changes would lead towards emancipation (e.g. Fay, 1975, 1987; Collier, 1994h(. This was coupled with an implicit view that emancipation was a form of escape from domination, illusion and unwanted constraints, with little or no acknowledgement that it depended on the construction of superior, alternative, progressive frameworks which could replace the old ones. But it is now increasingly apparent that normative questions of possible alternatives and what is good or bad about them cannot be evaded. How, without addressing such questions, could one decide what constitutes a superior alternative? Should there be a presumption in favour of community as a basis of social organiz- ation over other forms? Does liberalism provide the best framework for multicultural societies? What should be people's rights and responsibili- ties? What are our responsibilities to distant others, future generations, and to other species? There is little hope of achieving the goal of an emancipatory social science if it shuns normative discussions of issues such as these.

#### Regulated capitalism best.

Smith, PhD, 19

(Noah, https://www.bloomberg.com/opinion/articles/2019-03-08/letting-16-year-olds-vote-is-a-good-idea)

Depending on who you ask, the term "neoliberal" can apply to anyone from Ronald Reagan to Barack Obama. Some on social media have turned the term into a running joke, holding ironic Twitter polls to see who is the “chief neoliberal shill” (the winner last year was none other than yours truly). But at least one economist has articulated a coherent vision of neoliberalism -- Brad DeLong, a professor at the University of California-Berkeley who worked at the Treasury Department during the Bill Clinton administration. In 1999, DeLong wrote that a combination of market liberalization in developing countries and trade opening by rich nations would allow the poor countries of the world to end centuries of poverty. The plan seems to have worked. Market liberalization in countries such as India and China seems to have precipitated a shift to faster growth, while trade and investment links with rich countries have helped these and other developing countries tremendously: These changes helped pull a billion people out of desperate poverty, and billions more are on the way to becoming middle class. But there was a big hole in DeLong’s neoliberal plan. While the developing world surged forward, the U.S. began to encounter a host of economic problems. Wage stagnation, reduced mobility and rising inequality eroded the foundations of the New Deal society that had sustained the U.S.'s middle class during the second half of the 20th century. The U.S. resisted nationalizing its health-care system, resulting in a cumbersome public-private hybrid arrangement that allowed costs to mushroom while letting some people go uninsured. And financial deregulation led to a crisis and a huge, long recession throughout much of the developed world. Now, DeLong is ready to throw in the towel. In a recent interview, he declared that left-leaning advocates of neoliberal policies in the U.S. were mistaken in thinking they would find a political partner on the center-right. The plan was always to cushion the blow of international trade and easing of regulations on business using government programs, such as universal health care and a robust social safety net, to make sure the working class wasn’t left behind. But, DeLong argues, Republicans rejected that compromise, insisting that any neoliberalism be of the free-market-fundamentalist variety: Barack Obama rolls into office with Mitt Romney’s health care policy, with John McCain’s climate policy, with Bill Clinton’s tax policy…[but] John Boehner, Paul Ryan, and Mitch McConnell [were] the leaders of the Republican Party, and…decided on scorched earth[.] As a result, DeLong declared that old-line neoliberals need to pass the baton to the political left. Others aren’t ready to let DeLong off so easily. In the Boston Review, a panel of economists writes that neoliberalism got the policy wrong as well as the politics. Their various suggestions for post-neoliberal policies include increasing labor’s power with greater unionization and wage boards, tighter regulation of the finance industry and restriction on trade in order to protect U.S. workers. Mike Konczal of the Roosevelt Institute echoes their assessment. Many of these are good ideas. But in rejecting neoliberalism as a concept, the critics go too far. First, progress in the developing world has been impressive -- something for which neoliberalism probably deserves a lot of credit -- but it is far from complete; most of South Asia is still very poor, and much of Africa is just beginning to industrialize. To curb the flows of trade and investment with these countries would be a grave abdication of the U.S.’s international and humanitarian responsibilities. Second, neoliberal policies might have led to faster productivity growth in the 1990s and early 2000s: Tech Boom or Something More? Total factor productivity\* Source: Federal Reserve Bank of St. Louis \* Index 2011 = 1 Contrary to popular belief, wages also increased during that period. The spurt of growth is commonly attributed to the information-technology boom, but that boom might not have been possible if the U.S. had more strictly regulated emerging industries in order to protect favored incumbents. It’s worth noting that West Europe and Japan, whose policies were somewhat less neoliberal than the U.S.’s, ended up producing relatively few big new tech companies, and have failed to catch up to U.S. levels of per capita income in the years since 1990. Finally, although economic blunders have come from the political right in the U.S. in recent decades, it’s also possible for the left to make big mistakes -- not just in poor countries, but in rich ones too. Germany suffered high unemployment in the 1980s and 1990s, thanks to its rigid labor market regulations; eventually, it eased those restrictions, which substantially lowered the unemployment rate. Sweden had a very progressive tax system, but scaled back redistribution in the 1990s in order to speed growth. France, too, has sometimes been forced to curb its ambitions for redistribution and regulation when these produced economic instability and slow growth. The U.S. needs a neoliberal contingent to help insure against missteps like these. So neoliberals’ ideas are still needed. A move toward social democracy should help correct much of the inequality that has arisen in the U.S., while fixing dysfunctional industries like health care and finance. But left-leaning neoliberals like DeLong will still be needed in order to restrain social democrats’ more ambitious impulses, to protect the U.S. economy’s entrepreneurial private sector, and to make sure that technological progress and international trade don’t get forgotten.

#### Status quo isn’t neoliberal – state support for concentration of market power is the most important factor in unsustainable economic models.

Ann **PETTIFOR** Director of the Policy Research in Macroeconomics (PRIME) research network**’21** “State of Emergency” *Boston Review*: Public Purpose

The second gap is a kind of misdiagnosis. The authors follow Goldin in assuming that “neoliberalism” is the “dominant economic model” today. It is not. Instead, as Susan K. Sell has recently argued, “the term ‘neoliberalism’ . . . has become a very large conceptual tent that obscures some important differences between the sharp shift to markets in the 1970s and 1980s under Reagan and Thatcher and the global capitalism of the twenty-first century.” As Sell explains:

Key features of the contemporary era include the outsized role of intangibles in the global economy (e.g., intellectual property, services, financial instruments such as derivatives and securities), the rise of financialization, the quest for profits over economic growth, and the pursuit of competitiveness—not competition—in global markets.

These features are not always compatible with orthodox, hard-line neoliberalism. Under this new order, there is increased concentration of economic power, and the owners of intangibles face even less competition than they did before thanks to the state-financed protection of intellectual property (IP) law.

Another distinctive feature of capitalism today is the way it has decimated labor rights and gutted unions—even more comprehensively than under Reagan and Thatcher. Work has become more precarious, even while societies have relied on “essential workers”—in many sectors mostly drawn from communities of color—for their survival throughout the pandemic. These labor market developments, coupled with systemic racism and ever-increasing digitalization, mean that a corporation like Apple—which calls itself a technology company, not an intangibles company—can bring in $1,500 per iPhone, whereas Foxconn and its workers—who manufacture the actual product—get pennies on the dollar.

As Mazzucato and colleagues point out, governments have “accepted externally imposed rules-based frameworks limiting discretionary interventions.” They have done so because international trade agreements are not about trade at all—as even a classical neoliberal might point out—but about entrenching the oligopolies of home-grown IP corporations and billionaires, owners of intangibles, and controllers of global value chains. Governments have neglected antitrust enforcement at home, Sell argues, because they care less about concentration in domestic markets and more about their corporations being globally competitive. Ever since the Uruguay Round of multilateral trade negotiations that ended in 1993, the United States has worked tirelessly to increase property protection, whether through the Trans-Pacific Partnership or massive public investment in the military to ensure enforcement.

This protection explains why, even in a global pandemic, “missionoriented ” governments could not ensure the global distribution of a vaccine. Patents had been written to exclude others from using knowledge owned by the vaccine manufacturing corporations or Big Pharma. And it’s not just vaccines. A review of the range of masks used during the COVID-19 pandemic revealed that 309 had industrybacked patents behind them. As Sell argues, any government wishing to protect the health and thereby the domestic economy of its people—by compulsory licensing and parallel importation, say, to make essential medicines affordable and accessible—would find its pro-health initiatives blocked by Big Pharma, given the threat to profits and to shareholder capital gains.

This state-backed enforcement of concentrated economic power, together with a state-subsidized financial system buoyed by central bankers, gives the lie to the suggestion that our dominant economic model is neoliberal. In other words, the problem is not that states are not action-oriented. Instead it is that taxpayer resources are deployed to sponsor an increasingly concentrated private sector that has intensified inequality. It is thanks to political decisions—such as the Nixon Shock to international financial architecture fifty years ago—that capital is mobile, that public assets are privatized, and that taxes are dodged. Meanwhile, taxpayers have repeatedly come to the rescue of the private, globalized, and deregulated financial system, bailing them out when they inevitably fall into crisis. In just the same way, the power of today’s Big Pharma oligopolies depends on capital mobility, tax evasion, and a private, deregulated shadow banking system, which in turn is backed and managed by public servants at central banks.

Putting all this together, the lesson is clear: if governments are to use Earth’s finite resources to develop viable strategies for tackling the grand challenges that threaten the very existence of human civilization, the answer cannot lie in the sound creation of an “industrial policy,” however ambitious. The globalized, financialized, monopoly capitalism of our day instead requires wholesale structural reform. Recognition of the role played by taxpayers and states in upholding and extending the power of both Silicon Valley oligopolies and Wall Street investment banks should provide the rationale, the anger, the energy, and the momentum to bring today’s capitalism to heel in the interests of public institutions, public resources, and the public good. Only then will it be possible for governments to devise strategies that protect the security and interests of their people.

#### C. Pursuit of antimarket purity dooms alternative to irrelevancy – alienates potential allies and assumes non-market economics wouldn’t oppress.

Julie **NELSON** Global Development and Environment @ Tufts **‘6** *Economics for Humans* p. 37-40

Problems with the Market-Critic Prescriptions

At the end of the last chapter, I brought up evidence of poverty and corporate abuses that raise questions about the adequacy of the probusiness, free-market prescription for curing social ills. Do the prescriptions of the market critics for “small is beautiful/’“government to the rescue,” or “separate spheres” solutions give us grounds for more hope?

The “small is beautiful” prescription contains, of course, some truth. It is true that acting ethically is a more complicated process the larger and more complex the level of organization involved. Likewise, the “government to the rescue” advocates make some good points. It is easier for any one company to do the right thing if there is public pressure on all companies to do the right thing, and a government regulation can be a good tool for applying such pressure. On an even larger scale, international public agreements may be the only hope for addressing global climate change issues. These are far too big for any one nation, let alone one company, to take on. And there is some truth in the “separate spheres” view. There are some social welfare problems for which private, market solutions don’t work. Care for people who are poor and ill or otherwise needy cannot be provided on a purely market basis. The funds have to come from somewhere other than the “consumers” of the services. Public or private nonprofit allocations of money are necessary.

But while the values held in high regard by market critics are praiseworthy, and the prescriptions contain partial truths, I find the prescribed solutions lacking when held up to criteria of realism and effectiveness. Sometimes the proposed solutions could cause real damage.

A first problem is that these views tend to assume not only that the market sphere is driven exclusively by self-interest, but that self-interest is exclusive to the market sphere. They often seem to assume that if an organization is small, or nonprofit, or governmental, then non-self-interested motivations can be trusted to take over. We should consider the evidence on this.

Families, for example, are very small nonprofit organizations, presumably governed by interests of love and intimacy (as in the Victorian image).The newspaper reminds us daily, however, that families can also be characterized by domination and abuse, even violence. Sometimes being in a small-scale organization just means being under the thumb of a small-scale oppressor.

Community organizing is a great way to bring a group together to work on issues of social concern and to create opportunities for activism. Community organizing was very effective in South Boston in the 1970s, for instance, when big community demonstrations were organized to fight racial integration of the local public schools. Sometimes community groups carry out agendas of racism. And it is not uncommon for community activists motivated by not-in-my-backyard sentiments to try to push undesirable projects off on some other community. Communities, like individuals, can act in purely self-interested ways.

Nonprofit and religious organizations can bring people together to work for goals other than profit.The Boston diocese of the Catholic Church, for example, is legally not allowed to be motivated by profit. It was the maintenance of its own institutional hierarchies and reputation that motivated it to quietly move priests who sexually abused children from one parish to another, thereby supplying the abusers with fresh victims. Nonprofit institutions—even those ostensibly concerned with maintaining moral and spiritual values—are not immune to evil.

In an era of suspicious elections, campaign finance fiascos, and powerful lobbyists, one has to be naive in the extreme to believe that governments can be trusted to automatically or naturally work for the common good.

Appeals to small communities, nonprofits, or governments to take over economic activities “in the public interest” seem to me to bring in a deus ex machina solution.Yes, it would be nice if it worked. But how do we know that those selfish motivations critics assume drive the market are not also going to show up in families, community organizations, nonprofits, and the state?

A second problem with these views is that they largely pull the rug out from under their own noble drives. Because money and power are associated with greed and oppression, money and power are treated as inherently morally suspect. People who possess these, such as corporate executives who might be willing to engage in ethical discussion (if given the chance), are labeled as the evil “them,” separated by a large gulf from the moral “us.” Thus, potential allies and power bases are eliminated. This aversion to money and power has, I believe, been especially damaging to the sectors of the economy in which hands-on care is provided to children, the sick, and the elderly. Remember this poster: “It will be a great day when the schools have all the money they need and the air force has to hold a bake sale to buy a bomber”? How true. But the antimoney ideology reinforces exactly the bake-sale, nickel-and-dime mentality for human services that that poster decried. The damage this attitude has inflicted on caring work will be taken up further when I look at issues of money and motivations in chapter 4. A third problem is that, even if the prescriptions given by market critics were viable once put in place, there would still remain the problem of getting there. The massive promarket tide now flooding the United States and global institutions presents an intimidating reality check. The “small is beautiful” view tells us that we must have a massive economic restructuring— the thorough destruction of large corporations as a form of economic organization—before we can really be human in our economic lives. This would require a gargantuan change— larger, perhaps, than the Industrial Revolution and the rise and fall of Communism combined. If, on the other hand, we hope to be rescued by the rise of powerful, purely public-spirited interventionist governments, the current political climate makes it look like we may be waiting a very long time. Every step toward wresting control away from those with money and power will, market critics correctly perceive, be resisted by those with money and power.

Some people enjoy tilting at the economic machine—or at windmills, like Don Quixote in his hopeless crusades. In fact, I admire the spirit of people who keep to their praiseworthy, treasured values against all odds. But what if the futures envisioned by market critics, visions that tend to seesaw between the utopian and apocalyptic, are not the only options? What if the proposed solutions are unsatisfactory because the market critics have, unfortunately, combined good values with erroneous “facts” about what an economy is?

#### COVID proves cap sustainable and is k2 vaccine – free markets like Germany had less COVID deaths – less cloud computing, zoom, or pharma slows down lockdown, more dead

Colville 20 (Robert, Director of Center for Policy Studies. Capitalism is not to blame, it’s our escape route out of this mess. 5-1-20. <https://www.ft.com/content/10db1944-8b85-11ea-a109-483c62d17528> ///shree)

The coronavirus crisis represents a reckoning for capitalism. And it’s not just Jeremy Corbyn saying so. A host of virtuous voices are insisting that any bailouts must separate the corporate sheep and goats, with exemplary punishment for firms that have used such abominations as offshore registration, share buybacks and dividends. Even the FT insists that “one of the consequences of the pandemic must be a redrawing of the relationship between business and society”.

This misreads not just how we got into this mess, but how we can get out of it. Obviously, no one wanted a pandemic. Yet if it had to happen, now is arguably the best time in history. Imagine coping with the last few weeks of lockdown without Zoom, Netflix or Amazon. Imagine how quickly the government’s furlough website would have fallen over without cloud computing behind it. Imagine how much longer it would take to produce a vaccine without the efforts of official bodies, NGOs and pharmaceutical companies cutting the likely development time from years to months.

None of this progress was made in a vacuum. It was possible because the UK is a rich, sophisticated, free-market economy. One in which firms like Barbour can retool to make surgical gowns and scrubs for the National Health Service, or BrewDog can make hand gel. In which AstraZeneca can pile in behind Oxford university to scale up vaccine production. In which we have the wealth and creditworthiness to sustain the economy, albeit at enormous cost, through months in the deep freeze.

The one blessing of this epidemic is that the burden has, so far, fallen largely on countries that are able to cope. This is in sharp contrast to pre-crisis predictions. Economists such as Larry Summers, who warned of the risk of pandemics, universally assumed that the developing world would bear the brunt. A World Bank study in 2013, for example, predicted that a severe pandemic “would bring shared misery . . . with the poor and those in fragile states hit the hardest”.

The reason for such forecasts was simple and well-founded. As with the effects of climate change, it is wealth that is the best long-term guarantor of resilience. In recovering from this crisis, it is vital that we remember that lesson. The reason that Rishi Sunak is breaking the bank to preserve the private sector is because the chancellor knows that it is on the private sector that recovery will rest. We will not just be relying on the private sector to mass-produce and mass-market vaccines, tests and Personal Protective Equipment, but to deliver the growth, jobs and tax revenue that pull us out of this hole.

In the wake of the 2008 crisis, Britain benefited not just from an independent monetary policy, but from a far more flexible labour market than many of its European counterparts. The result — coupled with tax cuts on business and employment — was that we put on more jobs between 2010 and 2015 than the rest of the EU put together.

With millions more people now heading for the dole queue, the most valuable thing that ministers can do is not mouth pieties about social contracts but focus on bulldozing any and every obstacle to growth and job creation. That means spending less time pinpointing which businesses are “good” and which are “bad”, and more on supporting businesses of every kind — on genuinely making Britain the best place to start, grow and run a company.

It’s true that this crisis has things to teach us. We have very clearly optimised the economy — and indeed the health service — for efficiency rather than resilience. Vast interconnected supply chains are wonderful things but acutely vulnerable to the disappearance of individual components. Construction businesses who have attempted to keep working, with appropriate disinfection and distancing, have found themselves thwarted by the shuttering of builders’ merchants, or suppliers of components such as mortar or interior doors.

Yet, at the same time, government command and control does not have a much better record: it is striking that the health systems that coped best with the epidemic, in Germany and South Korea, had a much wider range of provision and much more decentralisation of functions like testing.

In the wake of the corona crash, there will inevitably be sectors that struggle. Making it as easy as possible for workers to move elsewhere has to be a key aim of policy. So does preserving Britain’s small and family businesses, which create the lion’s share of jobs and have long been neglected by Whitehall.

But the lesson of this crisis is not that the free market needs to be fixed. It is that it is still the best tool we have for delivering prosperity. Let’s stop obsessing about what kind of capitalism we want to have after the crisis and be grateful we have it at all.

#### 9.Alternative causes backlash, fails to resolve environmental challenges, and causes transition wars – growth solves.

Karlsson 21 – (Rasmus, "Learning in the Anthropocene" Soc. Sci. 10, no. 6: 233. <https://doi.org/10.3390/socsci10060233> 18 June 2021)// gcd

Unpacking this argument, it is perhaps useful to first recognize that, stable as the Holocene may have seemed from a human perspective, life was always vulnerable to a number of cosmic risks, such as bolide collisions, risks that only advanced technologies can mitigate. Similarly, the Black Death of the 14th century should serve as a powerful reminder of the extreme vulnerability of pre-industrial societies at a microbiological level. Nevertheless, it is reasonable to think of the Holocene as providing a relatively stable baseline against which the ecological effects of technological interventions could hypothetically be evaluated. With most human activities being distinctively local, nature would for the most part “bounce back” (even if the deforestation of the Mediterranean basin during the Roman period is an example of that not always being the case) while larger geophysical processes, such as the carbon cycle, remained entirely beyond human intentional control. Even if there has been some debate about what influence human activities had on the preindustrial climate (Ruddiman 2007), anthropogenic forcing was in any case both marginal and gradual. All this changed with the onset of the Great Acceleration by which humans came to overwhelm the great forces of nature, causing untold damage to fragile ecosystems and habitats everywhere, forever altering the trajectory of life on the planet (Steffen et al. 2011b). In a grander perspective, humanity may one day become an interplanetary species and thus instrumental in safeguarding the long-term existence of biological life, but for the moment, its impact is ethically dubious at best as the glaciers melt, the oceans fill up with plastics, and vast number of species are driven to extinction. Faced with these grim realities, it is of course not surprising that the first impulse is to seek to restore some kind primordial harmony and restrain human activities. Yet, it is important to acknowledge that, even if their aggregate impact may have been within the pattern of Holocene variability, pre-modern Western agricultural societies were hardly “sustainable” in any meaningful sense. Experiencing permanent scarcity, violent conflict was endemic (Gat 2013), and as much as some contemporary academics like to attribute all evils to “capitalism” (Malm 2016), pre-capitalist societies exhibited no shortage of religious intolerance and other forms of social domination. It is thus not surprising that some have argued the need to reverse the civilizational arc further yet and return to a preliterate hunter-gather existence (Zerzan 2008) even if this, obviously, has very little to do with existing political realities and social formations. Under Holocene conditions, the short-term human tragedy may have been the same, but it did not undermine the long-term ability of the planet to support life. In a world of eight billion people, already accumulated emissions in the atmosphere have committed the planet to significant warming under the coming centuries, with an increasing probability that committed warming already exceeds the 1.5-degree target of the Paris Agreement even if all fossil-fuel emissions were to stop today (Mauritsen and Pincus 2017). This means that sustained negative emissions, presumably in combination with SRM, will most likely be needed just to stabilize global temperatures, not to mentioning countering the flow of future emissions. According to the Intergovernmental Panel on Climate Change (IPCC), assuming that all the pledges submitted under the Paris Agreement are fulfilled, limiting warming to 1.5 degrees will still require negative emissions in the range of 100—1000 gigatons of CO2 (Hilaire et al. 2019, p. 190). The removal of carbon dioxide at gigaton scales from the atmosphere will presumably require the existence of an advanced industrial society since low-tech options, such as afforestation, will be of limited use (Gundersen et al. 2021; Seddon et al. 2020), especially in a future of competing land-uses. It is against this backdrop of worsening climate harms that the limits of “precaution”, at least as conventionally understood, become apparent. While degrowth advocates tend to insist that behavioral change, even explicitly betting on a “social miracle” (Kallis 2019, p. 195), is always preferable to any technological risk-taking (Heikkurinen 2018), that overlooks both the scope of the sustainability challenge and the lack of public consent to any sufficiently radical political project (Buch-Hansen 2018). While there may be growing willingness to pay for, say, an electric vehicle (Hulshof and Mulder 2020), giving up private automobile use altogether is obviously a different animal, to say nothing about a more fundamental rematerialization of the economy (Hausknost 2020). Again, the problem is one in which change either (a) remains marginal yet ecologically insufficient or (b) becomes sufficiently radical yet provokes a strong political counterreaction. A similar dynamic can be expected to play out at the international level where countries that remain committed to growth would quickly gain a military advantage. To make matters worse, there is also a temporal element to this dynamic since any regime of frugality and localism would have to be policed indefinitely in order to prevent new unsustainable patterns of development from re-emerging later on. All this begs the obvious question, if the political and economic enforcement of the planetary boundaries are fraught with such political and social difficulties, would it not be better to instead try to transcend them through technological innovation? Surprisingly, any high-energy future would most likely be subject to many of the same motivational and psychological constraints that hinder a low-energy future. While history shows that existing nuclear technologies could in theory displace all fossil fuels and meet the most stringent climate targets (Qvist and Brook 2015), it seems extremely unlikely, to put it mildly, that thousands of new reactors will be built over the course of the coming decades in response to climate change. Outside the world of abstract computer modelling, real world psychological and cultural inertia tends to ensure that political decision-making, at least for the most part, gravitates to what is considered “reasonable” and “common sense”—such as medium emissions electricity grids in which wind and solar are backed by biomass and gas—rather than what any utilitarian optimization scenario may suggest. Even if the global benefits of climate stabilization would be immense, the standards by which local nuclear risks are assessed, as clearly illustrated by the Fukushima accident which led to a worldwide retreat from nuclear energy despite only causing one confirmed death (which, though obviously regrettable, has to be put in relation to the hundred and thousands of people dying every year from the use of fossil fuels), underscores the uneven distribution of perceived local risks versus global benefits and the associated problem of socio-political learning across spatial scales. Almost two decades ago, Ingolfur Blühdorn identified “simulative eco-politics” as a key strategy by which liberal democracies reconcile an ever-heightened rhetoric of environmental crisis with their simultaneous defense of the core principles of consumer capitalism (Blühdorn 2007). Since then, declarations that we only have “ten years to save the planet” have proliferated, and so have seemingly bold investments in renewable energy, most recently in the form of US President Joseph Biden’s USD 2.25 trillion climate and infrastructure plan. Still, without a meaningful commitment to either radical innovation or effective degrowth, it is difficult to see how the deployment of yet more wind turbines or the building of new highways will in any way be qualitatively different from what Blühdorn pertinently described as sustaining “what is known to be unsustainable” (Blühdorn 2007, p. 253). However, all is not lost in lieu of more authentic forms of eco-politics. Independent of political interventions, accelerating technological change, in particular with regard to computing and intelligent machine labor, may one day make large-scale precision manipulation of the physical world possible in ways that may solve many problems that today seem intractable (Dorr 2016). Similarly, breakthroughs in synthetic biology may hold the key to environmentally benign biofuels and carbon utilization technologies. Yet, all such progress remains hypothetical and uncertain for now. Given what is at stake, there is an obvious danger in submitting to naïve technological optimism. What is less commonly recognized is that naïve optimism with regard to the prospects of behavioral change may be equally dangerous. While late-capitalist affluence has enabled many postmaterial identities and behaviors, such as bicycling, hobby farming, and other forms of emancipatory self-expression, a collapsing economy could quickly lead to a reversal back to survivalist values, traditional hierarchical forms of domination, and violence (Quilley 2011, p. 77). As such, it is far from obvious what actions would actually take the world as a whole closer to long-term sustainability. If sustainability could be achieved by a relatively modest reduction in consumption rates or behavioral changes, such as a ban on all leisure flights, then there would be a strong moral case for embracing degrowth. Yet, recognizing how farreaching measures in terms of population control and consumption restrictions that would be needed, the case quickly becomes more ambiguous. While traditional environmentalism may suggest that retreating from the global economy and adopting a low-tech lifestyle would increase resilience (Alexander and Yacoumis 2018), it may do very much the opposite by further fragmenting global efforts and slowing the pace of technological innovation. Without an orderly and functioning world trade system, local resources scarcities would be exacerbated, as seen most recently with the different disruptions to vaccine supply chains. In essence, given the lack of a stable Holocene baseline to revert to, it becomes more difficult to distinguish proactionary “risk-taking” from “precaution”, especially as many ecosystems have already been damaged beyond natural recovery. In this context, it is noteworthy that many of the technologies that can be expected to be most crucial for managing a period of prolonged overshoot (such as next-generation nuclear, engineering biology, large-scale carbon capture and SRM) are also ones that traditional environmentalism is most strongly opposed to. 3. Finding Indicators From the vantage point of the far-future, at least the kind depicted in the fictional universe of Star Trek, human evolution is a fairly straightforward affair along an Enlightenment trajectory by which ever greater instrumental capacity is matched by similar leaps in psychological maturity and expanding circles of moral concern. With the risk of sounding Panglossian, one may argue that the waning of interstate war in general and the fact that there has not been any major nuclear exchange in particular, does vindicate such an optimistic reading of history. While there will always be ups and downs, as long as the most disastrous outcomes are avoided, there will still be room for learning and gradual political accommodation. Taking such a longer view, it would nevertheless be strange if development was simply linear, that former oppressors would just accept moral responsibility or that calls for gender or racial justice would not lead to self-reinforcing cycles of conservative backlash and increasingly polarizing claims. Still, over the last couple of centuries, there is little doubt that human civilization has advanced significantly, both technologically and ethically (Pinker 2011), at least from a liberal and secular perspective. However, unless one subscribes to teleology, there is nothing inexorable with this development and, it may be that the ecological, social, and political obstacles are simply too great to ever allow for the creation of a Wellsian borderless world (Pedersen 2015) that would allow everyone to live a life free from material want and political domination. On the other hand, much environmental discourse tends to rush ahead in the opposite direction and treat the c limate crisis as ultimate evidence of humanity’s fallen nature when the counter-factual case, that it would be possible for a technological civilization to emerge without at some point endangering its biophysical foundations, would presumably be much less plausible. From an astrobiological perspective, it is easy to imagine how the atmospheric chemistry of a different planet would be more volatile and thus more vulnerable to the effects of industrial processes (Haqq-Misra and Baum 2009), leaving a shorter time window for mitigation. Nick Bostrom has explored this possibility of greater climate sensitivity further in his “vulnerable world hypothesis” (Bostrom 2019) and it begs to reason that mitigation efforts would be more focused in such a world. However, since climate response times are longer and sensitivity less pronounced, climate mitigation policies have become mired in culture and media politics (Newman et al. 2018) but also a statist logic (Karlsson 2018) by which it has become more important for states to focus on their own marginal emission reductions in the present rather than asking what technologies would be needed to stabilize the climate in a future where all people can live a modern life.

#### 10.Crisis narratives are wrong – peak growth and absolute decoupling are coming – only crisis causes overconsumption.

Nordhaus 20 – founder and executive director of the Breakthrough Institute. (Ted, “Must Growth Doom the Planet?,” The New Atlantis, Number 61, Winter 2020, pp. 76-86)//gcd

But the solution, such as it is, turns out to be right in front of us. Mainstream economic theory may posit that endless economic growth is desirable and possible, but what most macroeconomists actually fret about today is stagnation. The growth rate of developed economies has been [falling for decades](https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2018&locations=XD&start=1961&type=shaded&view=chart). This is due not to biophysical limits to consumption, but rather to the simple mathematical reality that the richer an economy becomes, the more wealth it needs to gain each year to maintain the same growth rate. Economic growth in wealthy post-industrial economies, in other words, appears to be inexorably slowing without the need for eco-austerity.

Each additional increment of growth in advanced economies also typically becomes less material-intensive, as sectors like manufacturing, mining, and refining account for a smaller share of total economic output, and knowledge and service sectors account for a larger share.

Population growth is slowing even faster than economic growth, as fertility rates typically fall as incomes and education rise — a dynamic that has been as robust a feature of global modernity as rising consumption. Japan, now 126 million people, could see its population fall by as much as half, to less than [60 million by 2100](http://www.ipss.go.jp/pp-newest/e/ppfj02/Rf_1_e.html). The European Union, currently about 500 million, could shrink to as low as [300 million by 2100.](https://www.eea.europa.eu/data-and-maps/indicators/total-population-outlook-from-unstat-3/assessment-1) Projections vary about when exactly global population will peak and begin to decline, but all major demographic forecasts project population growth trending in the same direction. Absent a radical change in the demography of a rapidly modernizing and urbanizing planet, global population [is likely to peak](https://population.un.org/wpp/Graphs/DemographicProfiles/Line/900) and begin to decline late in this century or early in the next.

Taken together, declining fertility, slowing per capita economic growth, the changing composition of economic activity, and continuing improvements in technology and resource productivity are likely, toward the end of this century, to bring a peak and decline in the consumption of most important resources, and in impacts upon the environment. In fact, for absolute material demands upon the natural environment not to decline over the long term, one of these three robust trends would need to reverse itself. Global fertility trends would need to start rising again. Long-term slowing of growth rates in industrialized economies would need to reverse. Or a broad swath of food, energy, and resource technologies would need to start to become less resource-efficient.

Smil, like a number of other environmental scholars, contests this notion. Instead, he argues that increases in resource productivity will not be put toward lower resource demands but toward more consumption and faster economic growth. Increasingly efficient steam engines in the nineteenth century famously did not result in a reduction in the use of coal but the opposite. One hundred fifty years of improving lighting efficiency hasn’t resulted in lower use of energy for lighting but rather has inspired us to light up many more things. Much of the long-term improvement in the efficiency of internal combustion engines, Smil notes, has gone toward creating larger and more powerful vehicles. As long as there is pent up demand for more consumption, some portion of productivity gains will be put toward more consumption rather than less resource use.

But the claim that these “rebound” effects assure the endless growth of material consumption assumes that demand for them will never saturate. For that to be true, it must also be the case that the wealthier we get, the more material consumption we will demand, forever. Thirty-six-ounce steaks must become 72-ounce steaks, SUVs must become eighteen-wheelers, 2,000-square-foot split-level ranch homes must become 4,000-square-foot McMansions, and so on.

There is really not much evidence for that proposition. Despite our affinity for supersizing our homes, our automobiles, and our portions, the U.S. economy has nonetheless been following the same basic trajectory as all other developed economies: toward slower national and per capita income growth and consumption of material goods and services. Rockefeller University’s [Jesse Ausubel has studied one hundred key resources](https://thebreakthrough.org/journal/issue-5/the-return-of-nature) in the United States over the past century, such as cropland, water, electricity, nickel, and petroleum. Over a third of them are past peak consumption. Similarly, the [United States](https://www.c2es.org/content/u-s-emissions/) and much of the [European Union](https://www.eea.europa.eu/data-and-maps/indicators/greenhouse-gas-emission-trends-6/assessment-3) have seen falling greenhouse gas emissions over the last decade or more, even [accounting for the outsourcing](https://twitter.com/MaxCRoser/status/1205057947103092741) of industrial production to places like China.

Globally, by contrast, resource use and carbon emissions continue to rise, despite long-term and ongoing improvements in resource productivity. This is the reason that Smil characterizes claims that economic growth might decouple from material and energy inputs as “highly misleading.” But the fact that overall demand for material goods and services has risen during the postwar period, when the global population has tripled and billions of people have moved from deep agrarian poverty to urban and industrial living arrangements provides no strong basis for Smil’s argument.

As both population and economic growth rates flatten out over the course of this century, it is likely that resource-productivity gains will overtake global economic growth rates, resulting in falling global demand for material resources over the long term. As [a 2019 Breakthrough Institute report](https://thebreakthrough.org/issues/food/livestock-revolution) showed, global pasture land, the largest single human use of land, peaked in 2000 and continues to decline even as global beef production continues to rise. In [a 2013 paper](https://doi.org/10.1111/j.1728-4457.2013.00561.x), Ausubel and colleagues argued that global cropland too appears close to peaking, even as global crop production continues to rise.

As with all growth curves, peak consumption of various material resources is not guaranteed to last. These trends could represent the top of a bell curve, the bottom of a new S-curve, or just a long plateau. But what they do demonstrate is that absolute decoupling of resources from economic growth is possible, even given a global economy today that still features robust population and income growth.

Smil’s case for establishing limits to growth depends upon a further claim: that preserving economic growth while reducing environmental impacts can’t happen soon enough to avoid surpassing key biophysical boundaries, which would lead to catastrophe for human societies. But Smil is too aware of the many failed proclamations of environmental scientists to make any strong or specific claim about what those biophysical limits might be. “Forecasting the state of modern civilization for generations or centuries to come remains an impossible exercise,” he acknowledges.

Elsewhere — for example in his 2010 book [Energy Myths and Realities](https://www.aei.org/research-products/book/energy-myths-and-realities/) — Smil has been less than catastrophic about global warming, the environmental risk most commonly thought to threaten the long-term survival of human societies. Nor does he worry that we will run out of resources. Instead, he invokes poorly defined challenges having to do with arable land, soil erosion, depleted aquifers, and crop productivity, combined with a changing climate. He is quite certain, though, that none of it can be sustained. “Pursuit of the highest possible economic growth rates, extending the culture of excessive consumption to additional billions of people, and treating the biosphere as a mere assembly of goods and services to be exploited (and used as a dumping ground) with impunity,” he argues, “must change in radical ways.”

In the end, Smil does offer a prediction of sorts, if not a very strong one. By the end of this century, he argues, human societies will need to impose limits upon economic growth in order to sustain human wellbeing for the long term. But as prophecy, Smil’s prediction is less provocative than it might first appear. By the end of this century, global population will likely be approaching zero growth anyway and a much more industrialized global economy will likely be struggling with the same headwinds to sustained rates of per capita growth that developed economies have been struggling with for decades.

In this regard, Smil’s prognostication, should it come to pass, would follow a similar pattern to many other environmental laws and regulations. Environmental restrictions have often lagged, not led, the peaking of pollution and other environmental impacts. We “saved” the whales only after we had hunted many global populations to extirpation, and developed better substitutes for most of the resources we depended upon them for. Forests have returned across many parts of the United States, Europe, and Latin America after we no longer needed those lands to grow food. [One 2005 study found](http://doi.org/10.1146/annurev.energy.30.050504.164507) that 76 percent of protected areas across Latin America and the Caribbean was under little threat of human development without protection, a dynamic that [appears to be the case globally as well](https://doi.org/10.1371/journal.pone.0008273). We reached a global agreement to protect the ozone only after [DuPont](https://doi.org/10.1002/(SICI)1099-0836(199711)6:5%3C276::AID-BSE123%3E3.0.CO;2-A) had developed a cheap substitute for chlorofluorocarbons.

In answer to modern environmentalism’s tautology, Smil offers redundancy. Human societies will need to impose global limits to growth, he suggests, around the time that growth, or at least growing demands upon resources, will likely be coming to an end anyway.

Given how much damage two centuries of unprecedented growth and economic development have done to the biosphere, many imagine, understandably, that the end of growth might be a panacea for the natural world. But we should not be so quick to assume that a smaller and less affluent human population will necessarily bring lower demands upon natural resources.

History is replete with episodes where much smaller human populations accounted for environmental destruction at large scales. Early North Americans in the paleolithic era cleared most of the continent’s forests and hunted mammoths and other megafauna into extinction. Across human history, roughly [three-quarters](http://www.fao.org/3/a-i3010e.pdf#page=21) of deforestation in temperate forests occurred before the Industrial Revolution, when the human population was less than a billion people, almost all of whom lived in deep poverty compared to today’s industrial standards.

More recently, economic crises in relatively developed regions, such as [Southeast Asia](https://doi.org/10.1111/j.1759-5436.1999.mp30003005.x), the [former Soviet Union](https://doi.org/10.1111/cobi.12450), and [Greece](https://doi.org/10.1080/13608746.2013.799731) have led to serious environmental consequences, as economically struggling populations turned to forests for firewood and to illegal hunting and fishing for food, to devastating effect.

For this reason, degrowth offers no guarantee that environmental impacts will decline. This is all the more so as calls for degrowth are frequently coupled with demands for a return to simpler, less technological, and non-synthetic systems for the provision of food and energy and for production of material goods and services. Less affluent economies more dependent upon production systems that use less technology would substantially increase the resource demands associated with consumption, and would erode or even entirely offset the benefits of lower levels of consumption.

#### 11.No environment impact and it’s self-correcting.

Kareiva ’18 [Peter, Ecology PhD; Valerie Carranza; Institute of the Environment and Sustainability, University of California, Los Angeles; “Existential Risk Due to Ecosystem Collapse: Nature Strikes Back.” *Futures* 102, p. 39-50]

The interesting question is whether any of the planetary thresholds other than CO2 could also portend existential risks. Here the answer is not clear. One boundary often mentioned as a concern for the fate of global civilization is biodiversity (Ehrlich & Ehrlich, 2012), with the proposed safety threshold being a loss of greater than .001% per year (Rockström et al., 2009). There is little evidence that this particular .001% annual loss is a threshold—and it is hard to imagine any data that would allow one to identify where the threshold was (Brook et al., 2013; Lenton & Williams, 2013). A better question is whether one can imagine any scenario by which the loss of too many species leads to the collapse of societies and environmental disasters, even though one cannot know the absolute number of extinctions that would be required to create this dystopia. While there are data that relate local reductions in species richness to altered ecosystem function, these results do not point to substantial existential risks. The data are small-scale experiments in which plant productivity, or nutrient retention is reduced as species number declines locally (Vellend, 2017), or are local observations of increased variability in fisheries yield when stock diversity is lost (Schindler et al., 2010). Those are not existential risks. To make the link even more tenuous, there is little evidence that biodiversity is even declining at local scales (Vellend et al 2017; Vellend et al., 2013). Total planetary biodiversity may be in decline, but local and regional biodiversity is often staying the same because species from elsewhere replace local losses, albeit homogenizing the world in the process. Although the majority of conservation scientists are likely to flinch at this conclusion, there is growing skepticism regarding the strength of evidence linking trends in biodiversity loss to an existential risk for humans (Maier, 2012; Vellend, 2014). Obviously if all biodiversity disappeared civilization would end—but no one is forecasting the loss of all species. It seems plausible that the loss of 90% of the world’s species could also be apocalyptic, but not one is predicting that degree of biodiversity loss either. Tragic, but plausible is the possibility our planet suffering a loss of as many as half of its species. If global biodiversity were halved, but at the same time locally the number of species stayed relatively stable, what would be the mechanism for an end-of-civilization or even end of human prosperity scenario? Extinctions and biodiversity loss are ethical and spiritual losses, but perhaps not an existential risk. What about the remaining eight planetary boundaries? Stratospheric ozone depletion is one—but thanks to the Montreal Protocol ozone depletion is being reversed (Hand, 2016). Disruptions of the nitrogen cycle and of the phosphorous cycle have also been proposed as representing potential planetary boundaries (one boundary for nitrogen and one boundary for phosphorous). There are compelling data linking excesses in these nutrients to environmental damage. For example, over-application of fertilizer in Midwestern USA has led to dead zones in the Gulf of Mexico. Similarly, excessive nitrogen has polluted groundwater in California to such an extent that it is unsuitable for drinking and some rural communities are forced to drink bottled water. However, these impacts are local. At the same time that there is too much N loading in the US, there is a need for more N in Africa as a way of increasing agricultural yields (Mueller et al., 2012). While the disruption of nitrogen and phosphorous cycles clearly perturb local ecosystems, end-of-the-world scenarios seem a bit far-fetched. Another hypothesized planetary boundary entails the conversion of natural habitats to agricultural land. The mechanism by which too much agricultural land could cause a crisis is unclear—unless it is because land conversion causes so much biodiversity loss that is species extinctions that are the proximate cause of an eco-catastrophe. Excessive chemical pollution and excessive atmospheric aerosol loading have each been suggested as planetary boundaries as well. In the case of these pollution boundaries, there are well-documented mechanisms by which surpassing some concentration of a pollutant inflicts severe human health hazards. There is abundant evidence linking chemical and aerosol pollution to higher mortality and lower reproductive success in humans, which in turn could cause a major die-off. It is perhaps appropriate then that when Hollywood envisions an unlivable world, it often invokes a story of humans poisoning themselves. That said, it is doubtful that we will poison ourselves towards extinction. Data show that as nations develop and increase their wealth, they tend to clean up their air and water and reduce environmental pollution (Flörke et al., 2013; Hao & Wang, 2005). In addition, as economies become more circular (see Mathews & Tan, 2016), environmental damage due to waste products is likely to decline. The key point is that the pollutants associated with the planetary boundaries are so widely recognized, and the consequences of local toxic events are so immediate, that it is reasonable to expect national governments to act before we suffer a planetary ecocatastrophe.

#### 12.Post-capitalist alternatives reinforces existing inequalities — only supplementing commons with a more democratic distribution of state resources like the plan solves

McCarthy, PhD, 5 (James, Geography @ PSU, “Commons as counterhegemonic projects” *Capitalism, Nature, Socialism* 16 (1) p. INFORMA)

Global commons can also be profoundly undemocratic and reinforce existing inequalities, however. To assert a commons at one scale is almost necessarily to deny claims at another. For example, to claim as the 'common heritage of mankind' something as aggregated and reified as 'biodiversity'41 is to stake a claim to resources in other sovereign territories and to override many national or indigenous claims, usually without consultation with or benefit to those most affected. Global 'commons' of this sort, even if redistributive in initial intent (as efforts to claim deep seabed mineral resources as the 'common heritage of mankind' were), have the potential to reinforce and perpetuate existing global inequalities, in part because they lack defining attributes of commons, such as genuine participation in decision-making by all or most members of the community in question and relative equity among the 'commoners.' So, new commons do not always mean greater democracy or sensitivity towards alternative property regimes. Such considerations highlight the importance of Klein's insistence on local diversity and autonomy: while she advocates a global reclaiming of commons, it is not at all clear that she advocates global commons in the end; rather, she seems convinced that the many local calls for commons she catalogues share a common political impulse and point the way towards a new kind of left politics. Finally, while she is explicitly anti-capitalist and certainly accords no deference to the market, her conviction that the local is necessarily more democratic and sustainable than the national seems to me based more on ideology than on evidence. I would argue that her vision of commons might benefit from a direct, robust engagement with arguments that the state, for all its flaws, remains the most democratic and democratizable of modern institutions.

#### 13.Scenario planning good – playing the game of government activates agency.

David **OWEN** Politics & IR @ Southampton **’14** in *On Global Citizenship* ed. Tully p. iix-x

For Tully, political theory is to be understood as the methodical extension of the self-reflective character of historically situated practices of practical reasoning and not as a distinct higher-order activity of theoretical reflection on these situated practices of practical reasoning. As such political theory is not oriented to legislating the nature and limits of practical reason (e.g. by trying to provide a general theory of justice) but to the reflective elucidation and negotiation of the contents and bounds of practical reason. The authority of the reasons offered by political theory are not to be seen as modelled on the commands of a rational legislator specifying, for example, the form of the just society but rather as more akin to invitations to consider looking at our political relationship in a different way. We can distinguish three steps in Tully’s ‘public philosophy’ that comprise its critical activity.

The first is that, following Wittgenstein, Skinner and Foucault, it grants a primacy to practice, that is, it focuses on the practices of governance and the exercise of freedom within and over the norms of these practices that shapes the forms of thought, conduct and subjectivity characteristic of the present**.** From Wittgenstein, Tully draws out the point that Arendt’s understanding of the practice of freedom – of speaking and acting differently in the course of a language game and so modifying or transforming the game – is not a special feature of politics or a form of freedom restricted to certain modes of human interaction but, rather, is a general feature of human practices and relationships. Tully takes Skinner and Foucault to be the primary inheritors of this outlook. In the case of Skinner, this involves tracing the intersubjective conventions that govern political reflection in a given context in order to show how political actors in that context have exercised their freedom in modifying those conventions. In the case of Foucault, it involves providing a genealogy of the problematizations in terms of which we understand ourselves as bound by certain limits; a genealogy which is, at the same time, a redescription of those limits. Foucault’s approach shares both Arendt’s understanding of the activity of freedom as modification or transformation of games of governance and the view of Wittgenstein and Skinner that such freedom is a feature of any and all human practices, but Foucault also develops Nietzsche’s point that this activity of freedom is an agonistic relationship and, thereby, links the following elements together: the practice of freedom, the modification of the rules governing the relationships among players in the course of a game and agonistic activity. Public philosophy in Tully’s sense begins with the calling into question, and concern to modify, a game of government on the part of those subject to it.In this respect, it is best construed as an expression and an enabling of the agonistic activity of freedom.

The second step is that Tully does not attempt to develop a normative theory as a way of adjudicating or evaluating the calling into question of the game of government. Rather public philosophy engages in what might be termed ‘redescription with critical intent’. First, public philosophy focuses on disclosing the historically contingent conditions of possibility for the practices of governance in question and the form of problematization that it exhibits before, second, offering a redescription that alters the self-understanding of those subject to it, and struggling within it, in ways that enable them to perceive the arbitrary constraints in what is given as universal, necessary and obligatory. Public philosophy achieves this objective through two elements. The first, adopting Wittgenstein’s practice of perspicuous representation, is designed to bring to light the unexamined conventions of the language games within which the problem and proposed solutions to it arise. The second, combining Foucault with the Cambridge School, is a genealogical account of these language games designed to free us from the hold of these unexamined conventions.

The third and final step in Tully’s critical activity is that this historical and critical relation to the present does not stop at calling a limit into question and engaging in a dialogue over its possible transformation, but also attempts to establish an ongoing mutual relation with the concrete struggles, negotiations and implementations of citizens who experiment with modifying the practices on the ground. Public philosophy does not aim to speak for those subject to government, but rather aims to provide them with resources for speaking for themselves.

## 1AR

### FTC

#### *Counterforce is inevitable BUT works and is stabilizing*

Keir A. **Lieber &** Daryl G. **Press 17**, Lieber is Associate Professor in the Edmund A. Walsh School of Foreign Service and the Department of Government at Georgetown University; Press is Associate Professor in the Department of Government at Dartmouth College, “The New Era of Counterforce: Technological Change and the Future of Nuclear Deterrence,” International Security, vol. 41, no. 4, 04/01/2017, pp. 9–49

What About Countermeasures?

Countries will surely address the growing **vulnerability** of their nuclear arsenals by **try**ing to develop **counter**measure**s** to thwart advanced sensor and strike systems. They will seek to deploy radar jammers, anti-satellite weapons, and decoys. They will try to adapt mobile missile doctrines to reduce vulnerability, for example, by timing movements to elude satellites and minimizing communications to thwart signals intelligence efforts. The new era of counterforce will not be static; it will be characterized by vigorous efforts to develop countermeasures, as well as equally vigorous efforts to overcome them.

Yet, there are **good reasons to expect** that the **net result** of these efforts will leave nuclear delivery systems **more vulnerable** than they have been in the recent **past**. First, **hunters** are **poised to do well** in the back-and-forth battle of countermeasures. Counterforce is the domain of the **powerful**; those that are seeking to **track** enemy nuclear forces typically have **greater resources than their rivals**.99 Additionally, the countries that are leaders in sensing technology have an **advantage** in the **race** to build (and thwart) countermeasures. As Brendan Green and Austin Long observe about the Cold War ASW competition, U.S. superiority in passive acoustics helped the **U**nited **S**tates **quiet** its **own** SSBNs, which in turn allowed it to **practice** and **hone** its **tracking** capabilities.100 Expertise in **sensors** and **countermeasures** go **hand in hand**. Perhaps most **importantly**, many **counter**measure**s** reduce **one** vulnerability at the **cost** of **exacerbating others**. For example, limiting **comm**unication**s** between mobile missiles or submarines and their command authorities reduces vulnerability to **signals intercepts**, but it increases vulnerability to attacks designed to sever (or simulate) their **c**ommand **and c**ontrol.101 Avoiding **coastal roads** neutralizes **offshore sensors**, but it **channels** forces into a **smaller zone**, easing the **search** problem. Even the **simplest** countermeasures, such as increasing **security** near sensitive facilities to prevent the emplacement of unattended ground sensors or improving air defenses around key sites to thwart UAVs, may **cue** hunters to the **presence of high-value sites**.

### AI

#### *2---smart governance follows on from tech in smart cities, better addresses needs of the people*

**Cambro-Fierro and Pérez 1-31** Jesús J. Cambra-Fierro,Lourdes Pérez, 1-31-2022, "(Re)thinking smart in rural contexts: A multi‐country study," Wiley Online Library, <https://doi.org/10.1111/grow.12612>  (Jesús J. Cambra-Fierro is Professor of Marketing at the University Pablo de Olvavide of Sevilla, where he acts as the Dean of the Faculty of Business. His research interests are related with marketing, CSR and business ethics. He is also interested on Smartization processes at different scopes. The results of his research have been published in leading journals. &&& Lourdes Pérez. Before joining TBS, she worked in firms such as Hewlett-Packard, Basf and Procter&Gamble. Her research interests are related with strategic alliances and relationship marketing. She is currently researching in the field of smart cities, taking Barcelona as reference.)

The presence of **smart governance systems that make** increasing **use of info**rmation **and communication techno**logies **improves the ways of making decisions and implementing improvements in the daily lives of smart areas** (e.g., energy consumption). **Smart governance**, with the help of ICTs, **enables the participation and collaboration of various stakeholders in decision making, and may help to solve potential tensions between development and rural life** (Cowell et al., [2020](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0012); Visvizy et al., [2019](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0047)). Moreover, we believe that **new tech**nologies could also **help to** develop **innovative governance combinations such as electronic platforms**. These **platforms use** ICTs to **encourage citizen participation in decision making**, improve the provision of information and services, **and enhance** **transparency**, **accountability** **and** **credibility** (Gil et al., [2019](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0016)) **showing the possibility of a collaborative link between governments and society** (Ferro et al., [2020](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0015); McGuire et al., [2022](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0029)). Other examples of the usefulness of ICTs in smart villages are related with cost reduction and quality improvements in public service delivery, so **tech**nology **should be considered** not only as a creator of bigdata bases but also **as an auxiliary tool for decision making** and facilitator of public service delivery (e.g., Stojanova et al., [2021](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0041)). In these cases, there are clearly governance mechanisms that promote the active participation of citizens, almost always led by groups of committed champions driving change. **This creates a** strong **sense of identification** among local citizens and private companies **with the proposals for action** and “forces” the various public administrations to become necessary partners of the initiatives. This process of value co-creation rejects the passive view of the role of citizens and presents new challenges for managing adequate governance systems. 5.3 Citizen engagement and quality of life Once adequate provision of public services has been guaranteed, there are great opportunities in rural areas to increase inhabitants' QoL (Stojanova et al., [2021](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0041)). For example, less time is needed for local trips and commutes; **there is often more interaction between residents because people know each other better, help more, depend more on each other; [and] the environment is usually more inclusive** (e.g., all children go to the same school); rural residents have more time available to themselves and their families. Community and sense of belonging tend to be stronger too—which, in turn, can make rural areas more autonomous and independent (Cowell et al., [2020](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0012); Stojanova et al., [2021](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0041)). Hence, the peripheral character of some villages may explain why many socio-cultural traditions are maintained, as a number of our study participants highlight their concern with maintaining local identity and traditions. The construction of social networks and the enlistment of multiple actors—citizens, civil authorities, private companies and other stakeholders—increase the capacity to contribute to a real, structural, and sustainable change that aims to ensure an adequate QoL (Carvalho et al., [2018](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0010); Nicholds et al., [2017](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0033); Visvizy et al., [2019](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0047)). **In every smart vision, this public-private interaction**, which **affects the social, political and organizational relationships of local communities**, must be present, **shaping** and validating **the initiatives** that emerge from these participatory processes, **empowering inhabitants** and making them jointly responsible for the outcomes (e.g., Komorowski and Stanny, [2021](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0021); Wolski & Wojcik, [2019](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0050)). Li et al. ([2019](https://onlinelibrary.wiley.com/doi/full/10.1111/grow.12612#grow12612-bib-0023)) **use the notion of** “Smart Sustainable” **development to emphasise economic development, social equity, QoL, and environmental protection**.

#### *3--- Smart Cities Prevent Brain Drain---keeps doctors and nurses long term*

**Coolfire Core 19** – citing study by Mckinsey Global Institute, Smart cities: Digital solutions for a more livable future, https://www.coolfiresolutions.com/blog/smart-city-technology-quality-of-life////MF

Smart city technology has the potential to improve key quality of life factors for city residents.

**Ongoing research suggests that smart city initiatives are improving quality of life** (QOL) **for urban residents** — often in non-trivial ways. In 2018, the McKinsey Global Institute analyzed dozens of smart city applications across 50 cities and discovered that **such initiatives can improve urban QOL by as much as 10-30%**. McKinsey’s analysis looked at applications like predictive policing, intelligent traffic signals, smart parking, and data-driven public health interventions. Clearly, the advantages of “smart” initiatives go beyond cost savings and efficiency improvements. When implemented strategically, emerging technologies can have a measurable impact on qualitative factors as well. **Smart city technology is already starting to change lives for the better**, and more change is on the way. To drive ROI against QOL metrics, municipal planners and city agencies must give them as much attention as they do factors like energy use and air quality. Quality of life doesn’t measure just one aspect of urban living — from the time residents spend sitting in traffic, to how safe they feel walking around downtown, the metric has many dimensions. Although there is no one agreed-upon rubric for QOL, a number of organizations have used a mix of both objective and subjective factors to define the concept. For instance, the World Health Organization (WHO) proposes its WHOQOL as an international, cross-cultural assessment. This measure emphasizes health-related statistics, including safety, recreation, traffic, pollution, transportation, mobility, and community support. Similarly, a 2018 study in [Journal of Cleaner Production](https://www.sciencedirect.com/science/article/pii/S0959652618303846) identified four main domains that could make up QOL — societal services and structuring, environmental health, material well-being, and community. Each year, many organizations rank the most livable cities. The U.S. News & World Report [2018 quality of life index](https://www.usnews.com/info/blogs/press-room/articles/2018-04-10/us-news-unveils-the-2018-best-places-to-live) ranked cities based on factors like affordability, job prospects, and well-being. Austin, TX topped the list, followed by Colorado Springs, CO., and Denver, CO. The crowd-sourced site [Numbeo](https://www.numbeo.com/quality-of-life/region_rankings_current.jsp?region=019) collects data on QOL factors like cost of living, pollution, crime rates, healthcare quality, and commute length. By these measures, Raleigh, NC., Madison, WI., and Dallas, TX., top the list of most livable cities. Mercer, a global HR consultancy firm, creates a [yearly QOL index](https://mobilityexchange.mercer.com/Portals/0/Content/Rankings/rankings/qol2018a789456/index.html), analyzing and ranking cities worldwide for factors like recreation, health, the availability of consumer goods, public services, and transportation. Topping Mercer’s list are Vienna, Austria, and Zürich, Switzerland. And of course, it’s possible to rank the least livable cities, based on factors like median home value, poverty rate, crime, infrastructure, and education. By some stats, the least livable cities include Salt Lake City, UT. and Atlanta, GA. — largely due to elevated crime rates — along with [economically depressed](https://247wallst.com/special-report/2018/06/10/50-worst-cities-to-live-in-3/10/) cities like Baltimore, MD., and Cleveland, OH. Of course, the vast majority of cities fall somewhere in the middle — and these could very well be the cities with the most potential to improve through smart city initiatives. **A positive quality of life means more than happy residents. It means attracting new residents, retaining high-value ones, and preventing “brain drain.”** It likewise contributes to lower costs related to health care and utilities. Ideally, creating a high quality of life will even boost a city’s economic prospects.

### Neolib

#### Financialization’s sustainable — criticism’s unwarranted reductionism

Konings, PhD, 18 (Martijn, Associate Professor of Political Economy at the University of Sydney, author of *The Emotional Logic of Capitalism* and *Capital and Time: For a New Critique of Neoliberal Reason*, series editor for the Stanford University Press book series, Currencies. 02-07-18. “A Critique of the Critique of Finance.” Stanford University Press Blog. https://stanfordpress.typepad.com/blog/2018/02/a-critique-of-the-critique-of-finance.html)

Critics of neoliberal capitalism rarely recognize the productive power of speculation. If there is one theme that unites the various critiques of contemporary finance, it is the emphasis on its speculative character. Financial growth is said to be driven not by the logic of efficient markets, but rather by irrational sentiment, “animal spirits” that do not respect fundamental values. Emphasizing the role of volatility in contemporary capitalism (evident at the time of writing, as the stock market is experiencing a downturn) is important as an antidote to notions of market efficiency and equilibrium. But it is a mistake to think that it provides a sufficient basis for effective critique. Predictions regarding the limits or collapse of neoliberal finance have simply not enjoyed a good track record. Over and over, the contemporary financial system has proven capable of sustaining higher levels of speculative activity than anticipated. This has certainly been true of the past decade. Capital and Time: For a New Critique of Neoliberal Reason is my attempt to make sense of this—that is, to understand what might be wrong or missing in the existing heterodox critique of speculation, and to advance a more accurate understanding of the role of uncertainty, risk, and speculation in contemporary capitalism. At the heart of the critique of speculation we find a distinction between real and fictitious forms of value. Although “essentialist” (or “foundationalist”) modes of explanation have been under fire across the social sciences for several decades now, when it comes to the critique of finance they have had considerable staying-power: without a notion of real value, it often seems, we lose any objective standard against which to assess the speculative gyrations of capitalist markets. Capital and Time asks what kind of critical theory we might develop if we bracket the anxious attachment to a notion of fundamental value. To that end, it turns to the work of economist Hyman Minsky. Although Minsky has been popularized precisely as a critic of speculation, he in fact insisted that almost all value judgments and investments were to some degree speculative—their success or failure would be determined in an unknown future. For him, the key economic question is how order emerges in a world that offers no guarantees, how more or less stable standards and norms arise amidst uncertainty. Of course, the “endogenous” origin of financial standards is a well-rehearsed theme in heterodox economics—indeed, it is a staple of the “post-Keynesian” literature that claims Minsky’s legacy. But such perspectives have never been able to break with the idea that financial stability is at its core dependent on external interventions that suppress speculative impulses. For Minsky, however, this is to miss the point about endogeneity. To his mind, there was no clear dividing line between financial practices and their governance: central banks and other public authorities are no more able to see into the future and to transcend uncertainty than private investors are. Minsky was therefore highly skeptical about official claims of discretionary precision management: financial governance is always embroiled in the very risk logic that it is charged with managing. That also means that financial policy can appear quite ordinary, even banal: at the heart of capitalist financial management is a logic of backstopping and bailout that responds to the possibility that the failure of an institution may take down wider financial structures. The stability of the post-New Deal financial system is often attributed to the Glass-Steagall separation of the stock market and commercial banking. But Minsky tended to view Glass-Steagall as one of several measures to direct bank credit away from the stock market towards other, no less speculative ends, notably consumer and mortgage financing. To his mind, the stability of the post-war period derived rather from the creation of an extensive financial safety net (which included, for instance, deposit insurance, which removed the rationale behind bank runs) that served to socialize risk. This institutional arrangement turned out to have a significant drawback: a pattern of chronic inflation emerged that, by the late 1970s, was widely perceived as a major problem. Minsky’s lack of faith in the possibility of cleanly staged external interventions led him to feel that that there was no real way out of this predicament. Monetarist doctrines, ascendant during the 1970s under the influence of Milton Friedman, relied on exactly the belief in an arbitrarily defined monetary standard that Minsky rejected as naïve. Muddling through, it seemed, was the price of avoiding another financial crash and depression. The Volcker shock of 1979 changed this dynamic in a way that Minsky had not foreseen but that is comprehensible when seen through the lens he provided us with. Paul Volcker looked to monetarism not as a means to enforce an external limit or standard on the financial system, but as a politically expedient way to break with accommodating policies and to proactively engage the endogenous dynamics of finance. The consequences of the Volcker shock were predictable (which is exactly why the Federal Reserve had been reluctant to pursue similar policies in previous years): inflation gave way to instability and crisis. Inflation was conquered as jobs were lost and wages stagnated. And, far from money being returned to its neutral exchange function, opportunities for speculation multiplied. The American state was never going to sit idly by as the financial system returned to dynamics of boom and bust: when instability took the form of systemic threats, authorities would bail out the institutions that had overextended themselves. Of course, Volcker would not have been able to predict the specific features of the too-big-to-fail regime as it emerged during the 1980s and evolved subsequently; but the very point of the neoliberal turn in financial management that he had overseen was to create a context where risk could be socialized in ways that were more selective and therefore did not entail generalized inflation. The inflation of asset values that has been such a marked feature of the past four decades has always been premised centrally on the willingness of authorities to view the “moral hazard” of the too-big-to-fail logic as a policy instrument—even if they may have decried it officially as a regrettable corruption of market principles. Spectacular bailouts, mundane policies to protect the key nodes of the payment systems, the “Greenspan put”, the different iterations of quantitative easing—these are all variations on that basic too-important-to-fail logic. Existing critical perspectives tend to view crisis and the need for bank bailouts as manifesting the essential incoherence of neoliberal finance, its lack of solid foundations and the irrationality of speculation. Capital and Time breaks with such moralistic assessments. The way deepening inequality and the speculative growth of asset values continue to feed off each other is troubling for any number of reasons, but there is nothing inherently “unsustainable” about it—the process does not have a natural or objective limit. At this point in time, the critique of speculation does little more than lend credibility to official discourses that present crises as preventable and bailouts as one-off, never-to-be-repeated interventions. In that way, it prevents us from critically relating to a neoliberal reality that has been shaped to its core by the speculative exploitation of risk and uncertainty, and in which regressive risk socialization serves as the everyday logic of financial governance.

#### Private, start-up firms key to innovation – public innovation fails.

Hemphill & Wu ’20 [C. Scott; Moses H. Grossman Professor of Law @ New York University School of Law; and Tim; Julius Silver Professor of Law, Science and Technology @ Columbia Law School; “Nascent Competitors,” *University of Pennsylvania Law Review* 168(7), p. 1879-1910; AS]

Innovation. First, a nascent competitor is an innovator. Innovation can take the form of technical progress or new business models that better serve consumer needs. Protecting the fruits of innovation is important because new products and services drive economic growth. Such competition is valuable both because the entrant's product may represent a real advance and because the entrant increases the pressure on the incumbent to innovate in anticipation or response. 29 Competition also opens the door to further entry in this and other businesses. Finally, and perhaps most obviously, competition can benefit consumers by lowering the price paid for these innovations.

Over the last century and a half, small, innovative firms have played a particularly important role in the process of innovation and competition. This is not to discount the important history of innovation at big firms with large research laboratories, such as Bell Labs, Xerox PARC, and research labs at General Electric and Merck.30 However, over the same period, a significant number of disruptive innovations-those that transform industry-have come out of very small firms with new technologies unproven at the time: examples include the Bell Telephone Company, RCA, MCI, Genentech, Apple, Netscape, and dozens of others.31

There is a particular competitive significance of the big innovations at the smaller firms, for they also represent competitive entry, and sometimes completely transform the industry.32 New, unproven innovators are a key source of disruptive innovation.33 Consider that Bell's telephone did not improve the telegraph, but replaced it, or the impact of Apple's personal computer on the computing industry. As this suggests, nascent competitors can hold the promise of offering fresh competition for the market, not just in the market. They have the capacity to displace an incumbent through a paradigm shift-for example, a new platform for developing software or decoding a genome. Nascent competition tends to be important in industries marked by rapid innovation and technological change. Software, pharmaceuticals, mobile telephony, e-commerce, search, and social network services are leading examples.

#### Post-COVID stability requires U.S. alliances to contain transnational threats, Russia, China, and Iran---strong industrial capacity is key

Ladan Yazdian 20, Visiting Scholar and PhD Candidate at the Otto Suhr Institute of Political Science, “Shifting Geopolitics Make US Leadership More Important than Ever”, Geopolitical Monitor, 10/14/2020, https://www.geopoliticalmonitor.com/shifting-geopolitics-make-us-leadership-more-important-than-ever/

The post-World War II global order, which was set up to defy the Soviet Union, has changed and the era of American neo-isolationism begun. Fortunately, the United States has the necessary tools to cross over to this era, mainly its geography, maritime supremacy, and industrial capacity. However, other nations are vulnerable to American isolationism, particularly those which depend on the U.S. for maritime security and technological advancement. With only days left until the 2020 presidential election, both parties in the U.S. are headed into a new approach and they both share a deep concern about dependence on China’s manufacturing goods. This means that regardless of the outcome of the election, there will be a fundamental shift in U.S. foreign policy toward China, and the global pandemic only sped up the inevitability of this shift.

India, Japan, and Australia have enormous interest in participating in a dialogue with the U.S. to counter China’s assertiveness in the Indo-Pacific region. This was apparent in the Quadrilateral Security Dialogue or “Quad” with the United States. While the U.S. is the only country to recognize China as an “adversary” in its National Security Strategy, the resurrection of the Quad confirms the other participants’ changing stances. Even Russia, eager to raise its geopolitical profile in South Asia and to lead Eurasian affairs, senses that it should prevent China from taking over the Eurasia region, as it balances a tenuous relationship between India and China.

In Europe, although not a united front, distrust toward China is also growing. Despite the need to expand trade with China, the latest virtual EU-China summit between Xi Jinping and EU officials failed to produce a desirable outcome, including an expected investment agreement. This failure is due to several factors, including Beijing’s handling of the pandemic, its economic practices, and human rights issues related to Hong Kong. It appears that Europe’s demands on China are hardening.

The United States and Europe disagree on several strategic geopolitical issues, but they can work to resolve them. The United States’ insistence on ending the Nord Stream is based on concerns that Europe’s reliance on Russia’s imported gas will move Europe further into Russia’s orbit; this is while many European countries are reluctant to commit to defense spending and strengthening the NATO alliance. These are the areas that must be improved through vigorous diplomacy.

Recently, the United Nations Security Council (UNSC) rejected a U.S. resolution to extend a global arms embargo on Iran to curb Iran’s access to advanced weapons systems through the snapback process under UNSCR 2231. Iran is an important piece of the puzzle in dealing with China. The U.N.’s opposition to U.S. efforts highlights the failure of Washington’s coalition-building and diplomatic capacity to curb Iran’s contentious actions. It also underscores the absence of a viable Iran strategy to remedy the flaws of the counter-proliferation agreement known as the JCPOA. A unilateral U.S. withdrawal from the agreement without a workable replacement led to the diplomatic failure at the UNSC. The Trump administration made it clear that it did not think that the JCPOA fulfilled its counter-proliferation expectations and felt the need to renegotiate considering Iran’s post-deal behavior. This may be the case for any upcoming administration, considering regional uncertainty due to Iran’s behavior and the shortcomings of the agreement.

The fallout at UNSC was unfortunate, but it may be a just “bump in the road” in the trans-Atlantic alliance, as it signifies the importance of traditional relationships which, if undermined, can jeopardize global security. Meanwhile, the reactions of Germany, France, and the UK to Iran’s brutal execution of Navid Afkari and the hostage taking of dual-nationals appeared as a change of attitude toward the Iranian regime. This is a positive change in Europe’s stance that will provide an opportunity for cooperation between the U.S. and Europe to stand against the Islamic Republic’s human rights violations. Other areas of collaboration include maritime security, cyber security, and more vigorous intelligence-sharing.

Iran’s Supreme Leader has openly expressed enthusiasm for the “Turning East rather than West” political doctrine. Understanding this mindset, it is not strange to see why Iran may commit to a major 25-year economic, energy, and security agreement with China. If finalized, the agreement would extend China’s naval and intelligence access to the Persian Gulf, bring China closer to NATO and U.S. forces in the region, and could replace India as the primary developer of the strategic Chabahar Port. China is already building an extended area of influence through the China–Pakistan Economic Corridor which is a pillar of the Belt and Road Initiative. This ambitious project will allow China direct access to Gwadar Port on the Arabian Sea. Additionally, the completion of the Gwadar–Kashgar pipeline project will reduce China’s dependence on the Strait of Malacca. Such access would ensure that the vital flow of energy to China will not be disrupted and is intended to challenge the U.S. dominance in the region.

China’s move to dominate the Middle East and Eurasia is only one portion of the shifting geopolitics of the world. Considering Russia’s geopolitical position and its need to secure energy markets, Europe does not see a serious conflict with Russia on the horizon. However, Russia’s encroachments in Eastern Europe make the NATO alliance a tie that Europe cannot see weakened. As seen recently, Washington agreed to participate in the “Three Seas Initiative” to establish an economic, infrastructure, and digital belt around Central and Eastern Europe, create a “north-south” energy and infrastructure corridor in the region, and ultimately reduce the region’s dependence on Russian energy imports.

Despite the PRC’s numerous problems, including demography, geography, export-led economy, and lack of resources, to deal with the challenges presented by China, U.S. leadership must be restored, and a resilient trans-Atlantic alliance be built. Just as China’s intention to dominate the Himalayas will be countered, India’s relationship with Iran and the development of Chabahar Port is crucial in reaching peace and stability in Afghanistan. More importantly, the next U.S. administration must have a clearly defined policy toward Iran and work vigorously with its allies to achieve set goals. Such a firm alliance will be critical to ensure global stability. Without building a viable international coalition, it will not be possible for Western democracies to get the Chinese government to agree to any concrete changes and adhere to rules-based international order, just as it will not be possible to confront the complex global security challenges that lie in wait in the future.

#### Decline causes power vacuums and miscalc, causing world war

Dr. Robert Kagan 21, Stephen and Barbara Friedman Senior Fellow at the Brookings Institution, PhD in American History from American University, MPP from the Kennedy School of Government at Harvard University, BA from Yale University, “A Superpower, Like It or Not: Why Americans Must Accept Their Global Role”, Foreign Affairs, March / April 2021, https://www.foreignaffairs.com/articles/united-states/2021-02-16/superpower-it-or-not

The question is not whether the United States is still capable of prevailing in a global confrontation, either hot or cold, with China or any other revisionist power. It is. The real question is whether the worst kinds of hostilities can be avoided, whether China and other powers can be encouraged to pursue their aims peacefully, to confine the global competition to the economic and political realms and thus spare themselves and the world from the horrors of the next great war or even the still frightening confrontations of another cold war.

The United States cannot avoid such crises by continuing to adhere to a nineteenth-century view of its national interest. Doing that would produce what it produced in the past: periods of indifference and retrenchment followed by panic, fear, and sudden mobilization. Already, Americans are torn between these two impulses. On the one hand, China now occupies that place in the American mind that Germany and the Soviet Union once held: an ideological opponent that has the ability to strike at American society directly and that has power and ambitions that threaten the United States’ position in a key region and perhaps everywhere else, too. On the other hand, many Americans believe that the United States is in decline and that China will inevitably come to dominate Asia. Indeed, the self-perceptions of the Americans and the Chinese are perfectly symmetrical. The Chinese think that the United States’ role in their region for the past 75 years has been unnatural and is therefore transient, and so do the Americans. The Chinese believe that the United States is in decline, and so do many Americans. The danger is that as Beijing ramps up efforts to fulfill what it has taken to calling “the Chinese dream,” Americans will start to panic. It is in times like this that miscalculations are made.

Perhaps the Chinese, careful students of history that they are, will not make the mistake that others have made in misjudging the United States. Whether Americans have learned the lessons of their own history, however, remains to be seen. A century-long pattern of oscillation will be difficult to change. It will be especially so when foreign policy experts of all stripes regard support for a liberal world order as impossible and immoral. Among other problems, their prescriptions suffer from an unwarranted optimism about the likely alternatives to a U.S.-led order. Realists, liberal internationalists, conservative nationalists, and progressives all seem to imagine that without Washington playing the role it has played these past 75 years, the world will be just fine, and U.S. interests will be just as well protected. But neither recent history nor present circumstances justify such idealism. The alternative to the American world order is not a Swedish world order. It will not be a world of law and international institutions or the triumph of Enlightenment ideals or the end of history. It will be a world of power vacuums, chaos, conflict, and miscalculation—a shabby place indeed.

The messy truth is that in the real world, the only hope for preserving liberalism at home and abroad is the maintenance of a world order conducive to liberalism, and the only power capable of upholding such an order is the United States. This is not an expression of hubris but a reality rooted in international circumstances. And it is certainly a mixed blessing. In trying to preserve this order, the United States has wielded and will wield power, sometimes unwisely and ineffectively, with unpredictable costs and morally ambiguous consequences. That is what wielding power means. Americans have naturally sought to escape this burden. They have sought to divest themselves of responsibility, hiding sometimes behind dreamy internationalism, sometimes behind a determined resignation to accept the world “as it is,” and always with the view that absent a clear and present danger, they can hang back in their imaginary fortress.

The time has come to tell Americans that there is no escape from global responsibility, that they have to think beyond the protection of the homeland. They need to understand that the purpose of NATO and other alliances is to defend not against direct threats to U.S. interests but against a breakdown of the order that best serves those interests. They need to be told honestly that the task of maintaining a world order is unending and fraught with costs but preferable to the alternative. A failure to be square with the American people has led the country to its current predicament, with a confused and angry public convinced that its leaders are betraying American interests for their own nefarious, “globalist” purposes. The antidote to this is not scaring the hell out of them about China and other threats but trying to explain, again, why the world order they created still matters. This is a job for Joe Biden and his new administration.

#### Hegemony sustains peace---A transition now causes war---without liberal institutions violent autocracies rise to power

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It all sounds so sensible. The problem is that, after decades of living within the protective bubble of the liberal world order, we have forgotten what the world “as it is” looks like. To believe that the quarter-century after the Cold War has been a disaster is to forget what disaster means in world affairs.

Which other quarter-century would we prefer? The first quarter of the 20th century included World War I and the birth of communism and fascism. The second saw the triumph of Hitler and Stalin, the Ukrainian famine, the Holocaust, World War II and the invention and use of nuclear weapons. Even the quarter-century beginning in 1950 included the Korean War, the Vietnam War, three Arab-Israeli Wars and the Cuban Missile Crisis.

Perhaps our biggest failure is our unwillingness to imagine that things could look again as they did in the first half of the 20th century, with a few besieged democracies hanging on in a world dominated by dictatorships. Aggression was the norm then, not the exception, and every weapon invented by scientists was eventually put to use.

It should be hard to have a 1930s mentality today, since we know what happened next. But we comfort ourselves that those past horrors cannot be repeated. We see no Hitlers or Stalins on the horizon, forgetting that our forebears did not see them either. Those ambitious tyrants rose to power at a time when they faced few constraints: No nation or group of nations was willing or able to sustain an international order of any kind, much less one that might resist them.

Today we know that Vladimir Putin has grand ambitions but not yet the capacity to realize them. He reveres Stalin, but he is not Stalin. What would a less constrained Putin do? A Russia that restored its Soviet and imperial borders would be a far different player on the international scene than the Russia now confined east of Ukraine and the Baltic nations.

Today a more powerful China, with a new premier-for-life, is moving away from the cautious foreign policies of the Deng era. We cannot yet know what an even more powerful and less constrained China will want or do as it expands its regional and global influence, especially if it does so by military means.

We should also recall that the European peace established since the Cold War is less than three decades old. Prior to World War II, wars in Europe were brought on by a combination of growing nationalism, collapsing democracies and global instability, all of which are visible today. Those who oppose the American promotion of democracy abroad generally have non-Western nations in mind, but let’s not have too much faith in the West. Few of Europe’s democracies date back before World War II. It was in the West that fascism and communism arose, and it is in the West that democracy is at risk once again.

The emerging consensus today is that the U.S. has been doing too much. But what if we have been doing too little? We wanted to believe that the course of history was taking us away from the war, tyranny and destruction of the first half of the 20th century, but it may be taking us back toward them, absent some prodigious effort on our part to prevent such regression. Those who call themselves realists today suggest that we can do less in the world and get more out of it. It is a lovely fiction. Our real choice is between maintaining the liberal world order, with all its moral and material costs, or letting it collapse and preparing for the catastrophes that are likely to follow.

#### No political will.

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Now degrowers are not irrational people. The reason why they are pushed in this magical corner is because when they try to “do the numbers” they are led to an impasse. They do not want to allow for significant increase in world GDP because it will, even if decoupling (of which they are skeptical) happens, drive energy emissions too high. If one wants to keep world GDP more or less as now one must (A) “freeze” today’s global income distributions so that some 10-15% of the world population continue to live below the absolute poverty line, and one-half of the world population below $PPP 7 dollars per day (which is, by the way, significantly below Western poverty lines). This is however unacceptable to the poor people, to the poor countries, and even to degrowers themselves.

Thus they must try something else: introduce a different distribution (B) where everybody who is above the current mean world income ($PPP 16  per day) is driven down to this mean, and the poor countries and people are,  at least for a while, allowed to continue growing until they too achieve the level of $PPP 16 per day. But the problem with that approach is that one would have to engage in a massive reduction of incomes for all those who make more than $PPP 16 which is practically all of the Western population. Only 14% of the population in Western countries live at the level of income less than the global mean. This is probably the most important statistic that one should keep in mind. Degrowers thus need to convince 86% of the population living in rich countries that their incomes are too high and need to be reduced. They would have to preside over economic depressions for about a decade, and then let the new real income stay at that level indefinitely. (Even that would not quite solve the problem because in the meantime, many poor countries would have reached the level of $PPP 16 per day and they too would  have to be prevented from growing further.) It is quite obvious that such a proposition is a political suicide. Thus degrowers do not wish to spell it out.

They are  brought to an impasse. They cannot condemn to perpetual poverty people in developing countries who are just seeing the glimpses of a better life, nor can they reasonably argue that incomes of 9 out of 10 Westerners ought to be reduced.

The way out of the impasse is to engage in semi-magical and then outright magical thinking.

Semi-magical thinking (that is, thinking where the objective—however laudable- is not linked with any tools of achieving it) is to argue that GDP is not a correct measure of welfare, or that better outcomes in certain dimensions can be achieved by countries or peoples with a lower GDP (or lower incomes). Both propositions are correct.

GDP does leave out non-commercialized activities that are welfare-enhancing. It is,  like every other measure, imperfect and one-dimensional.  But if it is imperfect at the edges while fairly accurate overall. Richer countries are countries that are generally better-off in almost all metrics, from education, life expectancy, child mortality to women’s employment etc. Not only that: richer people are also on average healthier, better educated, and happier. Income indeed buys you health and happiness. (It does not guarantee that you are a better person; but that’s a different topic.)  The metric of income or GDP is strongly associated with positive outcomes, whether we compare countries to each other, or people (within a country) to each other. This is something so obvious that it is bizarre that one needs to restate it: people migrate from Morocco to France  because France is a richer country and they will be better-off there. American Blacks are worse off than American Whites in all dimensions, not least in terms of their income. This is the background to the Black Lives Matter movement that wants to make Blacks better off and equal in income and health to Whites.

Since this fails, the next approach taken by degrowers consists in pulling out individual cases of countries the have performed exceptionally well on some metrics (like Cuba on health) and those that have performed exceptionally badly (like US on life expectancy) and to argue that a certain desirable outcome can be achieved with much less money. It is indeed true that some countries or some people, despite their lack of income, have achieved excellent things while others have used their income inefficiently or wastefully. But it does not follow from such individual examples that they overturn the regularities described In the previous paragraph. What degrowers do is to first metaphorically run a regression of a desirable outcome on GDP or income, and when they observe that the two are closely correlated, forget about the regression, pull out an outlier, and claim that the outlier shows that the relationship does not exist.

That is clearly wrong too. So the next stage in semi-magical thinking consists in trying to convince people that they are wrongly pursing the Golden Calf of wealth and that much more modest lives would be better, or at least are feasible. To that effect they use baskets of goods and services that allow “modest” standard of living and satisfy all basic needs. But they fail to show us how such “modest needs” are to be implemented: how will people be obliged to consume only so much and not more? In war situations, this is done through rationing. Indeed, one could ration the number of square meters of textile that each household may be able to buy, introduce meat and gasoline coupons and so forth. It has been done many times. But degrowers know that a wartime economy in the peacetime would not be politically acceptable, so they just do the basket calculation, show that it is compatible with “planetary boundaries”, and leave it at that. How we are going to have that basket accepted by people, or implemented despite their will, is not something they desire to be disturbed with.

#### Profit motive.

Andreoni 20 – (Valeria, "The Trap of Success: A Paradox of Scale for Sharing Economy and Degrowth" Sustainability 12, no. 8: 3153. <https://doi.org/10.3390/su12083153> 2020)//gcd

From a theoretical perspective, if large similarities exist between sharing economy and degrowth, then extensive discrepancies occur in the way in which these two concepts are applied. As reported above, the sharing economy is a worldwide phenomenon rapidly growing across sectors and activities. Degrowth, on the contrary, has been developed through a model of living and academic debate and, up to now, a limited number of applications have taken place [50]. One of the inhibiting factors can be related to the difficulties in applying an alternative model in a system when the profit-oriented logic drives the main socio-economic dynamics. For this reason, a consistent overview of the possible implications generated by large-scale applications of degrowth is still missing. Given the fact that degrowth ideas could generate effective transformations only when adopted by the largest part of consumers, a specific analysis would be needed to investigate the impacts and feasibility of large-scale applications. Within this context, the main objective of the next sections is to hypothesize and discuss a paradox of scale, potentially able to drive the failure of alternative economic models. Given the fact that, from a theoretical perspective, many similarities exist between sharing economy and degrowth, the next approximate is the sharing economy as a large-scale application of degrowth. In particular, the main contradictions existing between the promises of the sharing economy and degrowth, are compared to the outcomes generated by practices. The discrepancies are then used to discuss the feasibility of large-scale applications of alternative economic models, such as degrowth. Being aware that the approximations used in this paper inevitably lead to simplifications, the objective of this analysis aligns with the idea previously discussed in other publications [50,69,70]. Testing the degrowth hypothesis through modeling and empirical assessments can contribute to develop the debate around sustainable transitions to build the bridge between academic discourse, socio-political initiatives, and business environment. 3.2. Promises versus Outcomes of Practices: Analysis of the Socio-Economic and Environmental Impacts Following the approach previously used by other papers [3,30], the main frames used to define the sharing economy are compared, in this section, with the socio-economic and environmental impacts generated by practices. The main objective is to identify existing tensions and to discuss the sustainability challenges of sharing. Starting from the analytical framework reported in Table 2, the main discrepancies existing between promises and practices are reported below. In Table 3, the main elements of discussion are summarized. 3.3. Economic Dimension: Promises versus Impacts of Practices A. Disrupt centralized institutions and large corporations versus creation of oligopolies: According to previous studies [26,28,30,71], the network externalities and economies of scale generated using Internet platforms, has facilitated the development of oligopolies and has reduced the market for small and local enterprises. In line with the examples reported in Table 1, most of the sharing economy’s submarkets tend to be dominated by a small number of companies that earned the dominating status by designing a specific business model or through an early market entry. The large quantity of transactions, needed to compensate the costs of technological investments, has converged the successful platform toward oligopolistic structures, clearly in contrast with the idea of “disrupt centralized institutions and large corporations” included as one of the promises of sharing [72,73]. B. Encourage small and local enterprise versus small-business competition: Instead of promoting small and local enterprises, the sharing economy has resulted in increased competition [74]. The development of sharing accommodation practices, such as Airbnb or Couchsurfing, for example, has provided a substitute for hotel nights in the cheaper segment of the market and has radically changed consumers’ preferences and behavior. According to [75], the users of the sharing economy (generally looking for cheaper solutions, local authenticity, and more unique experiences) have shifted the demand from the traditional hotel industry toward the sharing hospitality. Therefore, the market share of the small and family-run accommodations has been reduced. In addition, the possibility to supply accommodation without the need to be compliant with the regulations affecting the hospitality sector (such as fire, health and safety standards, and taxation) represents an element of unfair competition affecting the small businesses operating in the market. The lower costs associated with a lack of standards and regulations, has contributed to drive a reduction in the average hospitality price. According to data provided by [76], the increased competition among small accommodation providers has generated 8–10% revenue loss in the hotel sector in Austin, Texas. In a similar way, the estimation provided by [77] calculated that the 416,000 guests staying in Airbnb in July 2013 has generated around one million lost room nights for city hotels in New York. On the contrary, large corporations, offering hospitality solutions for business travelers, medium-high income consumers, and package holidays do not seem to be significantly affected [76,77]. C. Empowering individuals by promoting flexible employment opportunities and additional sources of income versus working-related uncertainties: The sharing economy has framed itself as a provider of flexible employment opportunities, where traditional employment contracts are substituted by short-term and freelance work [78]. The main implications of this working structure, however, seem to benefit businesses more than workers. Classifying workers as independent contractors, allow businesses to reduce the costs and to remove the legal liability for accidents arising at work. The lack of pension and insurance, together with income instability and insecurities is, on the contrary, one of the main downsides affecting the workers involved in the sharing economy’s markets [79,80]. In addition, the rapid expansion of this underregulated and underpaid working logic, is also affecting the traditional working markets. When an increasing number of agents get involved in the logic of less security and more flexibility, the overall working conditions can decline [81–83]. As reported by De Stefano [81] (p. 6), “extreme flexibility, shifting of risks to workers and income instability have long become a reality for a portion of the workforce in current labor markets that goes far beyond the persons employed in the gig-economy.” It can indeed be argued that working on collaborative platforms is part of a much vaster trend toward the casualization of labor [84,85]. D. Promote cheaper and easiest access to goods and services and provide opportunities for income redistribution, revenue, and savings versus prices increase, income disparities, and tax avoidance: As reported above, the easiest and cheapest access to goods and services has been described as an opportunity to increase consumption possibilities, particularly for the lowest-income categories. When considering the supply side of the sharing practices, however, the sharing economy can contribute to amplifying the income disparities existing in society [86]. As reported by [87], for example, the additional revenue generated by sharing accommodation benefits people with a middle or upper-income level. That is because, the lower-income categories, characterized by a limited availability of goods to share, are typically excluded from the supply side of the market. Sharing accommodation, has also been criticized for the negative impacts generated on the price of the long-term renting accommodation. The increase in profitability of short-term renting has driven a reduction of long-term renting supply, with consequent impacts for the lower-income categories living in rented accommodation. According to data provided by [88], the average renting price in New York has increased by 11% between 2005 and 2012, with an average income rise of just 2%. The redistributive factors of the sharing activities have also been largely criticized in relation to taxation. According to data provided by [89], the sharing economy was estimated to be worth about $15 billion in 2015 with the potential to grow to £$335 billion in 2025. The amount of tax collected, however, is limited and controversial. Airbnb, for example, is financially located in Ireland, where the money made from transactions taking place all over the world are collected. The lack of clear accountability and the related difficulties to track income, make tax avoidance an element of unfair market competition and a major social issue. The unclear international regulation and the difficulties in public surveillance, creates a clear opportunity for fiscal avoidance, with consequent implications for social disparities and redistribution [28,72]. In addition, as reported by [10], the fact that platforms do not give governments the access to transactions and user data does not facilitate the enforcement of regulations and the design of clear and consistent taxation systems. The creation of institutional boundaries, such as the cap in the number of nights offered in sharing accommodation is, for example, difficult to apply without a clear track of users and suppliers. A. Increase social bonding and collaboration versus social drivers’ reduction: As reported above, the sharing economy has often been described as a tool to generate a new form of collaborations, solidarity, and social bonding [34,90–93]. Researches have, however, highlighted that most of the sharing economy users have no desire to increase community bonds or to share communal links with other members [29]. The ability of platforms to create social connections seems also to have decreased over scale and time. According to studies published by [94,95], when a market expands, economic reasons prevail, and interpersonal connections became more casual and less durable. In a similar way, an analysis investigating the main car sharing motivations highlight that opportunistic and self-interest behaviors play a much more significant role than socio-environmental motivations [79]. Price convenience, savings, and accessibility seem to be the main factors driving most of the consumers’ choices toward sharing economy options [96–98]. B. Increase conviviality and community trust versus discrimination: Instead of increasing social equality and community trust, the sharing economy seems to be characterized by some degree of exclusionary and discriminatory behaviors [40]. Based on studies published [99–102], prejudicial discriminations in ratings and reviews have been found for Afro-American guests and Afro-American Airbnb owners and Uber drivers have reported to be discriminated in terms of longer average waiting times and more frequent cancellations. C. Networking increases versus reduction of face-to-face interactions: When the market expands and more profit-oriented actors enter in the sharing economy’s businesses, the social contacts and face-to-face interactions seem to reduce. The increasing use of online quality ratings, for example, contributes to the declining importance of personal relationships. In addition, the introduction of technological innovations, such as the smart locks on sharing accommodation, provides users with a digital service of check-in and key handover that allow for a complete avoidance of social interactions [10]. According to [103], 75% of Airbnb’s overall revenue come from rentals where the owners do not share the space with users. The initial idea of social connections, interactions, and trust have been taken over by activities operating with a small degree of social and face-to-face interactions. D. Promote the use of participative online resources such as open access, open sources, and collaborative platform versus income, cultural, and aging constraints: The development of information and communication technologies has been considered as an opportunity to facilitate the use of participative online resources and to democratize the access to information. However, the difficulties that a relevant percentage of the world population are experiencing in catching-up with technological development is de facto an element of exclusion for a large amount of people with income, cultural, and ageing constraints [104]. When applied to the context of the sharing activities, this general downside of information and communication technologies, can then exclude a specific group of people from participating in sharing exchanges. According to [75], for example 53% of the users are under 40 years old and across all the sharing economy industries the usage seems to decrease with an increasing age. 3.5. Environmental Dimension: Promises versus Impacts of Practices A. Reduce consumption versus consumption increase: As highlighted by [105], a relative cost reduction can increase the overall market demand. In the sharing economy, different elements can contribute to generate a “rebound effect” detrimental for resources: • The development of the sharing economy platforms and the creation of new markets expand the volume of commerce and inject additional purchasing power into the economy. In addition, the development of “on demand” economy (e.g., Uber), where the consumer creates new capacity by arranging a service that would not have been made in the first place, is in contrast with the idea of reducing the overall level of demand. The reduction of prices generated by (i) increasing competition, (ii) reduced dependency on ownership, and (iii)reduction of searching costs, can contribute to the rise of consumption [10, 40,106]. • The easiest and cheapest access to goods and services can stimulate unsustainable and indulgent consumption [107,108]. The cost reduction and the accessible increase related to car sharing practices, for example, can generate additional journeys and reduce the public transport demand. The possibility to cover a part of the travelling cost, offered for example by Blablacar and Kangaride, can change the individual decision on the travelling mode and, as reported above, increase the demand for less sustainable practices [4,109]. • The large amount of information made available by the use of the Internet, provides an extensive source of evidence about past usage patterns and consumers’ preferences. The online companies, with an easy access to consumer’s information, can use targeted advertising and tailored promotions to increase sales and market share. In addition, a tension also exists in relation to the fact that city cycle schemes are usually financed through advertising of large and multinational corporations, as Santander in London or Coca-Cola in Belfast. B. Reduction of energy and material demand versus increased use of energy and resources: A lack of clear data investigating the environmental impacts of the sharing practices make it difficult to analyze the transition toward a more sustainable economy. At the present, no clear evidence exists around the reduction of energy and material demand [10]. On the contrary, a study published by [110] shows that the ecological footprint of e-business is greater than conventional shopping. C. Promote reuse and responsible consumption versus lack of care: The short-term social relationships characterizing most of the sharing economy activities and the fact that consumers are paying for a temporary service, generally lead to a lack of caring attitude and reduce the incentives to treat products gently [4]. In line with the idea of moral hazard and information asymmetries, involved with shared resources [111], the deterioration rate of goods can be higher than in the case of a private ownership. In addition, recent studies suggest that users’ environmental motivations are often less important than the economic ones [112,113]. 4. Discussion: Paradox of Scale and Future Research Directions Based on the analysis reported above, the main findings of this paper can be summarized by the fact that the recent developments of the sharing practices seem to be in contrast with the theoretical frameworks used to define the socio-economic and environmental characteristics of sharing. When the scale expands, a profit-oriented logic seems to prevail and the idea of a more sustainable and socially connected economic system fails to be delivered. In particular, the profit opportunities are attracting an increasing number of for-profit businesses that use the socio-environmental and egalitarian statements as a way to increase the market share. In addition, the use of information and communication technologies, the related reduction of interpersonal connections, and the exclusion of people unable to catch up with technological development, impose constraints on social interactions and participation. As a result, the impacts and goals of the sharing economy seem to converge toward those of the traditional economic practices, where profit opportunities prevail on socio-environmental motivations. As previously highlighted by other authors [26,28], the theoretical pathway to equity and sustainability has been successfully reframed as a new form of neoliberal capitalism. Within this context, the findings of this paper highlight the risk of a paradox of scale, where the sharing economy fails to deliver as a consequence of success. If from one side, the more sustainable behaviors can generate effective changes only when applied by the majority of actors, on the other side, large-scale applications and expansion risk converging toward the traditional economic practices. This sort of trap is also highlighted by the recent path taken by the development of some local currencies. Initially organized as a way to sustain local business and promote a more responsible consumption, some of the local currencies have today expanded to include franchising and corporation activities. An example is provided by Colu, the Liverpool Local Pound, where franchising accounts for more than 10% of the businesses listed in the website. In addition, the percentage discount offered to consumers that purchase products by using the local currency is a stimulus for consumption increase, clearly in contrast with the idea of responsible consumption and sustainability. The use of virtual coins and the necessity to have mobile phones and internet connection also represent a factor of exclusion for the oldest and the less wealthy categories of society that in contrast would be those that could benefit the most from the development of a local and fairer economy.

#### Studies across countries prove decoupling works.

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Prior to comment on the results, their consistency has to be examined. This can be done by checking whether the sum of correlations and the average correlation have the same sign in Table 8. This is true for both lags and leads in both correlations, which means that the overall changes in the per capita income induce a consistent pattern of changes in the ecological deficit and in the GHG emissions. Concerning the association GDPpc&EDF, Table 8 shows that the average lag cross-correlations, CCEtGt (k0 is positive and the average lead crosscorrelations, CCEtGt (k>0) >0 is positive and the average lead crosscorrelations, CCEtGt (k>0)>0 is negative. The latter implies that while an increase in the per capita income has increased the ecological deficit in past, this will change in the future. The incidence of growth will reduce the pressure on the natural resources. The latter may be the joint product attributed to two distinct processes. First, such an event could be the result of a rise in the “eco-efficiency” which means that a unit of GDP is produced now with less environmental resources York et al. [30]. Beyond that, there might be a change in the consumption patterns, which involve substitution of environmentally harmful with less harmful goods and services. Very often, eco-efficiency and substitution are mentioned as requirements for the economy’s dematerialization [84]. Some advocate that the link between dematerialization and the resulting decoupling is a matter of society’s choice since it depends on the “appropriate” policy measures that mobilize technology and put forward incentives to reduce human pressure on the environment [85]. Notwithstanding, the whole issue is far from settled, see Bithas and Kalimeris [86] and Fletcher and Rammelt [87] for a critique. Gómez-Baggethun [88] refers to the resource efficiency and the policy induced substitution as technological and political utopias that cannot be sustained ad infinitum. By contrast, Table 8 shows that both the average lag and lead cross-correlations for the link GDPpc&GHG are negative. That means that the past reduction of GHG emissions as a result of growth will continue to exist in the future. Put it in the EKC jargon, Poland has reached a position, where the composition and technological effects dominates the scale effect. Hence, growth reduces the environmental impacts. Narayan et al. [82] have identified similar pattern for Poland’s CO2 emissions as well as for Germany, Czech Republic, Iraq, Slovak Republic and Sweden among others. The positive role of the eco-efficiency and substitution, discussed above, applies here as well. To recapitulate, the likely policy implications of the decoupling indices are examined by the cross correlation analysis. The analysis tried to investigate whether economic growth determines the changes in the ecological deficit and in the level of GHG emissions. The results provide evidence that economic growth in Poland will bring about a decline in the ecological deficit. Likewise, economic growth has reduced GHG emissions and will continue to do so in the future. The previous argument seems to echo a Parsonian modernization postulate, in the sense that economic growth is treated as a crucial determinant (“evolutionary universal”) of society’s change (implicitly through its impact on democracy, institutions and organizational capacity) [89]. This line of argument is not new, and the criticism raised is sound and fair [90, 91]. Notwithstanding, such a hypothesis prevails the EKC literature [92]. To cut a long story short, it seems that modernization theory, albeit severely criticized, is not dead. Various revivals and modifications have been put forward in the scholarly literature. Just to name a few: ecological modernization [93], reflexive modernization [94], re-modernization [95], global modernity [96]. Conclusions The paper applied the most appropriate decoupling indices in order to map the development trajectory of Polish economy. In the period between 1990 and 2016, Poland has achieved remarkable things. Primarily, growth seems that did not deteriorate the quality of the environment, since the human pressure on the environment, as captured by the resource and impact decoupling indices, was not associated with growth. Furthermore, from the cross-correlation analysis has emerged some rather interesting observations with profound policy implications. Poland has been a successful paradigm in terms of the ecological modernization theory. Growth seems to unfold without imposing significant pressure on the natural resources (a captured by the ecological deficit) and without causing environmental degradation (as captured by the GHG emissions).