# Towards A Technological Overhaul of American Antitrust

BY GINGER ZHE JIN, D. DANIEL SOKOL, AND LIAD WAGMAN

**R**ECENT OUTCRY FOR ANTITRUST reform argues that U.S. markets have become more concentrated, that large firms' profit margins have increased, and that part of these changes may be attributed to lax antitrust enforcement since the 1960s. While each of these arguments is part of an intense intellectual discourse, politicians have released numerous legislative proposals for what they presumably believe would fix antitrust practices. Despite the clamor, one tangible and factual reason for antitrust reform has not received adequate attention: the informational infrastructure within the U.S. antitrust system massively lags behind the development of the digital economy. That is, the federal antitrust agencies are improperly equipped to organize and operationalize knowledge in enforcement. As a result, the agencies may miss critical warning signs of potential anticompetitive conduct, since they are often unequipped to properly identify issues and do not allocate existing resources effectively (let alone ask Congress for the right kind of resources).

## A Brief Summary of Ongoing Antitrust Debate

Antitrust enforcement's role in the economy has been undergoing serious reflection in recent years. In addition to populist sentiment, economic critiques have transformed the antitrust debate. The issue driving the debate has been that antitrust agencies lack the appropriate tools to address certain fundamental questions.

In April 2016, the White House Council of Economic Advisers under the Obama Administration issued a brief describing the decline of competition in many U.S. industries.[1] In its conclusion, the brief pointed to antitrust and

*Ginger Zhe Jin is Professor of Economics at the University of Maryland, College Park. She is also the ADVANCE Professor of the College of Behavioral and Social Sciences at the University. D. Daniel Sokol is the Carolyn Craig Franklin Chair in Law and Business and Professor at the USC Gould School of Law, Affiliate Professor of Business at the Marshall School of Business, and Senior Advisor at White & Case LLP. Liad Wagman is Professor of Economics and the John and Mae Calamos Dean Endowed Chair of the Stuart School of Business at Illinois Institute of Technology.*

other government actions that could promote competition in a variety of industries. At the same time, peer-reviewed economic studies found mixed evidence on the state of competition. On the one hand, the revenue-weighted average price markup in the U.S. increased from 21% above marginal cost in 1980 to 61% in 2016, with a concomitant rise in the average profit rate from 1% to 8% during the same period, and a steady fall in the labor share in most industries between 1980s and 2012.[2] Some argue that the shift may, in part, be driven by the rise of superstar firms.[3]

On the other hand, some studies argue that market concentration is an outcome rather than a determinant of market competition;[4] that market concentration has declined since 1994 if markets are defined by products rather than industry sector;[5] and that the average markup increase from 2006 to 2019 in 100+ consumer product categories was primarily driven by lower marginal costs and lower consumer price sensitivities.[6] These studies suggest that signs alarming policymakers, observed at the sector and industry levels, may be a natural outcome of new technology[7] and demand changes, and do not necessarily imply a failure of antitrust enforcement.

These mixed results play into broader populist arguments, as well as a political narrative that the U.S. has a monopoly problem and that size is synonymous with a number of economic and social ills. Built-in inertia due to rigid staff structures, an increasingly partisan lean, and a lack of effective internal R&D agency functions and internal self-improvement processes (including in technology) have led to the enforcement agencies' inability to identify whether these trends are a result of antitrust inaction, and if so, under what circumstances they may be associated with either unilateral or coordinated effects. Part of the problem is that the antitrust agencies lack an adaptable, more data-driven, comprehensive approach. They do not have significant expenditures in data collection, aggregation, or analytics, and tend to frequently ask narrow, economics-based questions that are transaction specific, when fields like finance, operations research and marketing may have some relevant clues as to what may have driven market consolidation and its broader effects. Without proper diagnosis, it is difficult to better determine when to intervene and when traditional tools may be insufficient. Essentially, the antitrust agencies need to go through their own digital revolution to embrace more data analytics in order to answer enforcement and policy questions with greater precision.

Instead of pursuing a data revolution, antitrust solutions often range from not changing anything, throwing more money at the agencies to support their existing processes, to wholesale legal changes either for specific industries or across industries. On the legal side, a focus on fast, radical changes in outcomes—without a significant upgrade in policy and economic toolkits—tend to bring significant political swings across administrations, which may result in socially undesirable outcomes such as enforcement

disruptions, policy uncertainty, increased risks for firms and entrepreneurs, and less innovation.[8]

The focus instead should be on upgrading the toolkit. Economics plays a role in this upgrade. While economics has always been part of antitrust,[9] economic-adjacent fields have a significant role to play as well. For example, accounting, finance, strategy, information science, operations, and marketing offer empirical and experimental observations playing an important role in filling in conceptual blanks and rethinking theoretical assumptions as to how markets work. Long before the digital transformation and the ubiquity of the Internet, retailers had used data-driven technologies such as scanners, in-store path-tracking, eye-tracking, and radio frequency identification (RFID) to track consumer behavior and reshape business decisions. This manifested, for example, through personalized coupons, optimized store layouts, better inventory management, and dynamic product portfolios. The usage and impact of these technologies have been widely documented in various disciplines of academic literature, including outside economics. More recently, researchers have similarly demonstrated the extent of algorithmic pricing, data sharing, and privacy management in fields such as information science, computer science, and marketing.[10] A full understanding of these literatures would help to clarify the similarities and differences between concurrent and historical uses of data, and the roles that data has played in business strategy and market competition. To date, these areas have been minor players relative to law and economics.

Below, we outline real problems that the agencies face in their approach to antitrust enforcement as well as some potential solutions. These solutions include an embrace of a more technological and data-driven orientation in terms of processes and a hiring focus on digital and data analytics skills outside of the traditional information technology functions.

## Technology Gaps

As detailed below, there is a significant informational gap between the structure of antitrust agencies and the fast-moving business world, especially in the use of information and communication technology (ICT). This gap has kept antitrust agencies from understanding and using the technology and business frontiers, undermining the agencies' relevance and effectiveness.

To begin, consider the digital economy. Fifteen years ago, the top ten Fortune 500 companies operated in retail (Wal-Mart), energy (Exxon Mobil, Chevron, ConocoPhillips), manufacturing (General Motors, Ford Motor, General Electric), and finance (Citigroup, Bank of America, AIG). None related closely to ICT. As of today, at least three of the top ten are widely considered technology corporations (Amazon, Apple, and Alphabet), four specialize in health care (CVS Health, UnitedHealth Group, McKesson, AmerisourceBergen), and only two of those in the 2007 list remain top ten in 2022 (Wal-Mart, Exxon Mobil). More importantly, the

rise of ICT-oriented companies took place gradually: AT&T made the top-ten list in 2008, Hewlett-Packard in 2009, Apple in 2013, Amazon in 2019, and Alphabet in 2020. Proceeding further down the list, as early as 2018, 15 of the Fortune 100 were closely related to ICT.[11] Moreover, traditional companies are themselves going through digital transformations. Indeed, many are going through not merely transformations in terms of IT spending but also changes in business models to use data analytics more effectively and establish new revenue channels by identifying opportunities to operate as platforms, as well as changes in managerial mindset and incentives.

More broadly, the 2018 Annual Business Survey (conducted by the Census) provides comprehensive information on the diffusion of advanced technologies including artificial intelligence (AI), cloud computing, robotics, and the digitization of business information. Based on a national representative sample of over 850,000 U.S. firms, the survey finds that over 90% of the responding firms store information in digital format for at least one business function, and over 54% purchase at least one cloud service if they use information technology (IT).[12] While only 6.6% of U.S. firms adopt AI-related technologies, this rate climbs to more than 60% for firms with 10,000+ employees. In general, the adoption of advanced technologies is dramatically skewed towards older, larger firms; hence, the impact of technology on the broader economy is likely much greater than the percent of firms on the technology frontier. Since most antitrust concerns are about market concentration and monopolization, it is natural for antitrust agencies to pay more attention to large firms and keep fully informed of the technology frontier.

Not only does ICT help big firms, it has also enabled small firms, or even individuals, to create new products and reach global markets. In a series of publications, researchers describe the societal benefits of digitization in the cultural marketplace. They show that digitization has enabled cheap, easy self-publishing, weakening the gatekeeper role of traditional publishers and allowing more books, songs, movies, and short videos to be produced than ever before. Importantly, many new products are of high quality, resulting in significant gains in consumer surplus and overall welfare.[13] The long-tail phenomenon applies to physical goods as well, because e-commerce helps consumers to locate, evaluate, and purchase a far wider variety of products than they can via traditional brick-and-mortar channels, which in turn encourages small merchants to produce and sell niche products for remote markets.[14]

Venture capital has played an important role in the rise of the digital economy. In fact, large U.S. corporations such as AT&T, Xerox, IBM, and DuPont have gradually shifted away from scientific research since the 1990s, while more initiations from scientific research to commercial applications are carried out by VC-funded ventures using ICT.[15] Essentially, larger firms have used the VC-based ecosystem

to shift risk outside of the organization, enabling higher risk taking without the concern of quarterly analyst calls. Larger firms benefit because they can acquire successful start-ups, providing the larger firms with dynamic capabilities and complementary assets, while smaller firms benefit from being acquired.[16]

Given that larger, older firms have more resources to adopt ICT and that digitalization and venture capital enable innovations in technology startups, it is not surprising that mergers and acquisitions have been active among firms in the corresponding tech sectors (such as information science) and professional and technical services (as defined by two-digit NAICS codes). Contrary to the popular view, M&A activity is not limited to the tech sectors or a few giant firms in these sectors. Acquisitions of tech ventures are widespread across sectors of the economy; at the same time, only 13.1% of public firms have engaged in tech M&A from 2010 and 2020, and these firms tend to be larger and older than other firms listed on North American stock exchanges.[17]

In short, advances in ICT have drastically changed the sources of innovation, generated uneven technology adoption among different types of firms, and reshaped investment and M&A activity in a fast-growing digital economy. In many business areas, ICT enables large-scale intermediaries that serve millions of individual users and small firms around the globe. Thanks to network effects, these ICT-enabled platforms have disrupted many traditional industries and, as some have argued, become a new generation of gatekeepers.[18] The effects of larger platforms remain an open question, which presents challenges for antitrust authorities, in part because the institutional design of the agencies is less nimble than needed to broadly incorporate digital transformation dynamics.

In contrast to the fast-growing digital economy, the antitrust agencies in the U.S. are severely resource bounded and continue to use traditional tools to collect and process information. To be fair, the DOJ and FTC have invested to some extent in digitization in terms of the filing of pre-merger notifications under the Hart-Scott-Rodino Act, and in other capabilities, including the digital delivery and storage of raw data, as well as using programming and statistical software such as SAS, Stata, SPSS, and Python to process numerical databases and data submitted by firms or entities. We believe that the agencies can do significantly more to optimize their discovery processes, bringing data analytics tools to bear in investigations, in identifying focus areas, and for policy planning. However, many informational infrastructures inside the antitrust agencies have lagged behind the technology frontier of ICT and behind how large firms use ICT. Below are some examples:

***Example 1: Massive Data Deserts.*** The antitrust agencies have prioritized acquisitions of smaller companies by larger ones in both Clayton Act Section 7 and Sherman Act Section 2 cases. Relatedly, the FTC undertook a study under FTC Act Section 6(b) that focused exclusively on five big tech acquirers, even though there are a number of both big and private equity tech acquirers that have more regular deal flows than some of those five big tech acquirers.[19] However, the agencies fundamentally lack capacity to think about the types of questions to ask about such acquisitions within the larger venture capital backed ecosystem. For example, in their resource allocation, the agencies generally do not subscribe to databases containing information on broader technology patterns, including Pitchbook, Crunchbase, Refinitiv, FactSet, S&P, CB Insights, or similar trackers of venture deals.

Part of this desert reflects a poorly selected strategic desert of talking to the wrong stakeholders: with the exception of select events and hearings, there is no systematic conversation between antitrust agencies and the venture investment ecosystem, including traditional venture capitalists and corporate venture capitalists. The agencies know little about how investors evaluate startups, conduct due diligence, strike merger deals, their choice of financing, and their motivations to negotiate and foster relationships with industry incumbents.

Furthermore, the agencies are generally reluctant and limited in their ability to hire and train cross-disciplinary staff, beyond economists and attorneys, and exhibit increased dependencies on external vendors for developing internal systems. For instance, the agencies outsource the development of document management and analytics systems to external vendors. Such outsourcing means that any changes in their capabilities require specific and non-negligible funding, and consequently any needed change, even a minor change, is met with resistance due to budget constraints. Such vendor dependencies for software and analytics include systems for document review and pre-merger notification filings, which themselves could benefit from specifically-tailored, adaptable digitization for smarter, more efficient document review, and the broader extraction of insights on and agency-wide dissemination of sector patterns and trends.

Let us compare the U.S. agencies' experience to that of the UK's Competition Markets Authority, which has a dedicated unit of data scientists who work to give additional perspective to legal and economics case teams.[20] To better understand the dynamics behind the digital transformation requires staff with relevant technical skills. Much the same way one would not want to have senior leadership without lawyering skills for bringing cases, or a chief economist who lacks knowledge of the latest economic tools, chief technology officers at the agencies need to have the appropriate data analytics skills to be able to guide agency decisionmaking, to translate data analytics to workable legal rules, to continuously improve an agency's toolsets, and to assist staff in asking the right empirical questions. This is not limited merely to data analytics. The behavioral revolution in marketing research and practice means that these insights also impact issues such as switching costs,[21] entry,[22] and pricing.[23] However, antitrust analysis has been narrowly

focused on traditional industrial organization economics and insufficiently cognizant of empirical insights in other related business disciplines that have been at the forefront of empirical platform work.[24]

***Example 2: Organization of Technical Skills.*** Currently, within an agency, personnel and knowledge are largely in silos and cross-agency communication is even more scarce. The organization of skills and functions within an organization matters for the purpose of effective enforcement. There are two issues at play. The first is the lack of a standalone technology unit and the second is a need of tighter integration with other units within the agencies.

A lack of a specialized unit at the U.S. agencies focusing on (i) understanding technological innovation and (ii) incorporating the relevant and beneficial aspects of it across agency units means that skills cannot be deployed effectively into cross-functional teams and integrated. When there is no separate, empowered unit possessing equal status as legal and economic units, there is no opportunity to provide meaningful inputs consistently and horizontally across an antitrust agency.

The sporadic inclusion of staff members with more technical backgrounds on discovery calls is insufficient. An additional empowered unit with equal status helps the ultimate decision-makers appreciate the technological issues at play and may suggest a set of questions that economists and lawyers find less relevant to their core work but which are necessary for a better agency work product. Certainly, within companies, the roles of the chief data scientist, chief digital officer, chief information officer, and chief technology officer have grown in importance.[25] We believe the same forces are at play for digital transformation and coordination at the U.S. antitrust agencies. The greater the transformational urgency, the larger the need.

Economic analysis shapes antitrust law. It is impossible to understand antitrust without understanding its underlying economics. However, it is also the case that it is impossible to understand antitrust economics without understanding the underlying technology and technological dynamics that shape innovation. For instance, if economic models do not appreciate issues such as technological barriers to entry, tradeoffs in platform governance, or how platforms work, the models used in analysis will be off and the findings from incorrect models will lead to mistaken conclusions both for theory and empirical work. Likewise, lawyers need to better understand what is feasible as to legal theories of harm and potential remedies, and how to better optimize discovery to speed up the investigatory process and free up resources to bring cases. Lawyers would also benefit from better technology in the document review process—the tools used are often general market tools that are not specifically tailored to enhancing agency processes with frontier technologies, both in competition or consumer protection matters.

From an operational perspective, the use of data analytics for purposes of identification of anticompetitive activity plays an important role. For example, machine learning and textual analysis can be used in identifying tacit collusion as well as naked collusion, and developing collusion screens. Further, such tools can be used in estimating consumer demand and switching costs, identifying proactive ways to monitor businesses from public data (e.g., securities filings, analyst calls, product reviews on e-commerce sites, product review sites, online discussion forums, and social media) and from commercial data available via subscription. These tools also could allow for a better understanding of non-price competition. Moreover, data analytics tools can facilitate the application of software-driven learnings across cases and firms, while adhering to any case-specific confidentiality requirements through the same frontier privacy-preserving technologies for which the agencies themselves advocate in other domains.

***Example 3: Limited Ability to Request Relevant Information at Scale.*** The Paperwork Reduction Act (PRA) de facto limits FTC 6(b) studies to nine or fewer respondents—unless the agency goes through longer, more tedious processes to obtain the requisite approvals. Given that antitrust and consumer protection issues are frequently time sensitive (and the political nature of these issues make it more so), the agency tends to opt for adhering to the nine or fewer respondents limit. When respondents have numerous subsidiaries, such a limitation can render potential 6(b) studies practically useless. Furthermore, statutory confidentiality requirements mean that the FTC's 6(b) public reporting capability is limited to aggregate findings. And, while the FTC can internally disseminate firm-specific findings, doing so with its sister agency at the DOJ presents similar confidentiality constraints. In addition, Congress has the capability to request firm-specific information obtained as part of 6(b) studies, which may lead respondents to more forcefully negotiate the scope of their responses.

In contrast, resorting to Civil Investigative Demands (CIDs) from individual firms often follows a "model CID" approach, leading to relatively noisy information, with scope that lacks the cohesion, consistency, and uniformity that a 6(b) study can offer. Information from CIDs comes with its own confidentiality requirements, and is frequently difficult to utilize in related matters. Moreover, the CIDs themselves add to the perceived burden of the responding firms, arming them with the legal ammunition to resist requests for data and documents from potential 6(b) studies; that is, the CIDs themselves can interfere with the FTC's 6(b) authority when there are overlaps.

***Example 4: Challenges in Processing Data in Real Time and at Scale.*** The agencies receive most legal information as documents comprising text and figures, rather than as structured, numerical data fields. Often, these documents are left unused or underused because the agencies do not have the capability in terms of staff nor tools to process them comprehensively in real time. Similarly, whereas consumers can file complaints to the FTC in real time, their complaints are

mostly used for low-frequency public reporting (e.g., once-a-year summary of most complained categories) or ex-post justification of some ongoing cases. There is little effort (and few staff dedicated) to proactively screening and identifying new trends and patterns concerning wrongdoing from the complaints data at a high frequency.

These legacy informational infrastructure issues stand in a sharp contrast to those on the technological frontier widely used by the very firms that are often the targets of scrutiny by the agencies, including: real-time monitoring of competitor and consumer trends, algorithmic pricing, AI-driven product development and product customization, quality control, and AI-streamlined operations.[26]

Due to the combination of legacy informational infrastructures and data deserts, antitrust agencies are uninformed about business patterns and trends concerning new potential matters, unable to inform internal staff about relevant focus areas in existing matters, and unable to inform the broader community of stakeholders, including academia, about research areas that are relevant to the agencies and that those stakeholders can help further develop.

This deficiency is particularly strong when nascent products, nascent business models, and their relationships with established products and business models are concerned. While the agencies may receive information regarding a particular matter when they devote one-time resources to it, they lack a systematic capability to keep the information updated and comprehensive. As far as the broader economy is concerned, the agencies do not fully understand how information and communication technologies are integrated in business models, which means they lack the capability to develop new theories of harm for new business models, and cannot predict the potential consumer benefits and harms that alternative business models and technologies proffer, nor what alternative data policies could generally imply for a firm, its competitors, their business partners, and the broader consumer base.

## Proposed Solutions

To fix these underlying, real problems, antitrust tools need to be modernized for the era of digitization, independent of how antitrust agencies may refine their goals in protecting market competition. In fact, the debates about antitrust principles, including the viability and validity of the consumer welfare standard, market definition, price vs. non-price dimensions, and static vs. dynamic approaches, should all be guided by and viewed through the lens of contemporary knowledge about the business world and technology, not the other way around.

Our proposed solution comprises two complementary pieces: The first part pertains to organization-wide changes and the second part to tactical reorientation.

The first, and perhaps most critical need, is to chart a course for institutional reform of the U.S. enforcement system. All too often the proposed fixes target changes in

the law or presumptions but do not address the underlying capacity and strategic issues at the organizational level of the antitrust agencies. There is less emphasis across the political spectrum and antitrust views about placing effective controls and processes into place that would lead to better outcomes. In short, the antitrust system needs to acknowledge and address its massive lack of information, tools, and expertise.

The digital revolution is exactly the sort of systemic shock that the antitrust agencies need to embrace in creating a new organizational structure and way of thinking. As an initial step, it entails a better relationship with outside parties. Often, companies are unwilling to meet regularly with enforcers because they are concerned that such meetings will lead to additional scrutiny by these enforcers. Business units in particular are wary of meetings with the government to explain issues broadly. Not surprisingly, it is often the case that wherever there are public hearings, it is outside law firms and economists that serve as interlocutors between companies and the antitrust authorities. Hence, the issue is one of trust building between enforcers and companies. One example of how this works well in practice is the regulatory sandbox in the UK that the Financial Conduct Authority (FCA) has undertaken.[27] The regulatory sandbox would allow for companies to test out innovative products. This could be adapted in the antitrust setting to allow for off the record regular discussion groups to address digital transformation.

A transformation of thinking shall begin to treat the agency as a platform that enriches the study of competition and fosters relationships with complementors. It means more, not less, agency outreach to the business community. Some of this can mean the extent to which the antitrust authorities generate data and make the data available to support published research contributing to public knowledge dissemination. Hence, better data generation and sharing protocols should be established. This allows the agencies to get more work completed by external researchers and get the work out into the public sphere, as well as creating a better pipeline for recruitment of trained staff.

A digital transformation includes a change in mindset and processes. It means embracing digital technologies from all angles (personnel, hardware, software, analysis, and how to systematically generate and update knowledge), and the investment in knowledge management tools to ensure that staff and leadership have an ability to internalize agency knowledge that may be otherwise limited to a few individuals and potentially lost to turnover.

Such strategic changes are not impossible or impracticable. Both the DOJ and the FTC went through an economics-based transformation of building out dedicated economics units with their own staff and own reporting relationship analogous to that of lawyers. This improved agency decisionmaking as it allowed economists and economic analysis to have a distinct voice within the agency. Economists became agents of change within the agencies as

they pushed to have legal theories tied to actual economic harms.[28] An empowered and fully fleshed out software development, analytics, and technology group–rooted in data science, data access, data generation, and data collection–would aid in digital transformation in much the same way and reduce the dependency on external vendors for such systems.

The antitrust agencies can learn about digital transformation in other parts of government. For example, other federal agencies have advanced much more in digitization. The Department of Veterans Affairs' National Artificial Intelligence Institute has become a leader in genomics research and has advanced precision medical care for underrepresented groups.[29] In this sense, the DOJ and FTC are lagging behind, and should catch up quickly, especially given the fact that they are supposed to supervise market competition and therefore should get ahead of the curve of the market rather than lag behind it. A lack of effective agency design without the proper orientation and tools can hurt the mission of antitrust in the technologically-charged business environment that it regulates.[30]

How should the antitrust authorities operationalize this broader reorientation? We offer some general guidance:

*Better data gathering*. The agencies obtain most of their data from parties under investigation. However, this does not allow for effective long-range understanding, pattern identification, and strategic planning as to industry trends. There are many third-party data providers that offer licensed access to commercial information, including Bloomberg, CB Insights, Computstat, CRSP, Crunchbase, FactSet, Nielsen, Pitchbook, Refinitiv, S&P, and WRDS, among others, which would help transform agency thinking about how markets work. To be clear, the agencies should incorporate such external resources into their own specifically-tailored systems for data analysis and broader pattern and trend recognition, combining those external resources with improved internal data generation capabilities.[31]

*Develop and improve the complaint reporting system*. Many organizations invest in effective compliance systems. This is not limited merely to companies but also to other organizations. For example, the SEC has an investor complaint portal and FINRA has an effective BrokerCheck portal that allows for more effective ways to monitor problems in the marketplace.

*Develop and improve internal data generation and analysis capabilities*. The agencies collect and store large amounts of data as a result of complaints, merger filings, and investigations. There are opportunities to both utilize emerging technologies in the analysis of data, as well as to generate new datasets that are relevant to antitrust research.

*Reduce reliance on outsourcing*. The agencies frequently utilize external vendors for systems, software, and analytics development, and often encounter challenges and budget constraints in updating and improving outsourced software, as well as in creating new agency-specific tools as the need for them arises. This dependency on outsourcing introduces hurdles in the ability of agencies to digitize and optimize their operations, and should be reduced.

*Do not shirk on the competition advocacy mission.* Some of the biggest impact the agencies have is through their competition advocacy mission to create better functioning marketplaces.[32] This means more internal work on industrial trends, non-case-specific analysis, and the organization of topic-driven rather than narrative-driven conferences, in addition to interventions in anti-competitive legislations where there are possible policy choices that can achieve multiple objectives but are less distortive to competition. This advocacy message has recently been a lesser priority, and such outreach needs to be not only restored but expanded.

## Conclusion

The digital revolution is not limited to companies. Government agencies also need to change their thinking and infrastructure to account for the increased digitization of the economy. This entails not merely new resources but a new approach to the organization of antitrust, including incorporating trained staff throughout each agency with core competencies in software development, analytics, and new technologies, with expertise rooted in data science, data access, and data generation and collection. In seeking more input from technologists, we focus on the importance of staff and leadership in people with substantive training in how to perform data analytics rather than technology advisors whose education is solely in law and/or social sciences and who exist to criticize technology rather than figure out how to make use of it at the agency to optimize enforcement.

In parallel, the agencies should also work with Congress to (i) improve their capabilities to request relevant information from stakeholders regularly and consistently and at scale, and, to the extent possible, extract meaningful insights from it with the aid of the broader research community; and (ii) to broaden their abilities to generate and publicly disseminate relevant data. ▪

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