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Algorithms and Competition in the Digital Economy

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Algorithms & Competition

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The global economy is increasingly becoming a digital economy. By extension, this also means it is an increasingly algorithmic one. Algorithms drive much of the digital technology used in, among other things, e-commerce, communication and social media, transportation, high tech manufacturing, and advances in medical care. And they underlie the rapid advances occurring in artificial intelligence (AI) that are only likely to usher forth even greater economic transformations. [1]

Alongside the brisk development of artificial intelligence and the growth of the digital or algorithmic economy, the major firms driving technological and economic change have drawn increased attention from competition authorities and consumer protection regulators around the world. With a changing economy that relies more on digital algorithms, antitrust law and other forms of regulation have begun to react to these new realities—both by applying existing legal rules to new forms of economic activity and by adapting law and regulation to address the problems and evolving needs of an algorithmic economy. [2]

The transition to a digital or algorithmic economy is reflected in various measures of the growth of digital technology. Internet penetration has reached nearly 70 percent of the global population, with a comparable proportion now connected to the internet or telecommunications networks through mobile devices. [3] In the United States, direct measures of the digital sectors of the economy—such as software and hardware infrastructure, e-commerce, and various cloud-based, digital, and telecommunications services—indicate that they amount to about 10 percent of U.S. gross domestic product (GDP) and translate to at least 8 million jobs. Still more striking, the pace of growth in these digital sectors—around 10 percent—vastly outpaces the overall economic growth. And this is just a *direct* measure of digital economic activity. If one considers the indirect impacts—or what researchers have sometimes called "digital spillovers" that enhance other parts of the economy—the impact is even greater. One analysis of both the direct and indirect impacts on the global economy has estimated that about 25 percent of global GDP will be attributable to digital technology by 2025.

In this context, it is little surprise then that, out of the world's ten largest companies based on market capitalization, seven are digital technology or e-commerce firms: Apple, Microsoft, Alphabet, Amazon, NVIDIA, Tesla, and Meta. [4] It is thus also hardly surprising that—for better or for worse—these firms, and others like them, are increasingly

occupying the attention of competition authorities and consumer protection regulators around the world.

With this Foreword, we have been asked by the editors to draw out highlights from the last two years' worth of coverage in *Concurrences* of major antitrust-related legal developments occurring around the world. Without necessarily endorsing or rejecting any of the various policies or proposals that have occurred in recent years, this Foreword organizes and describes key legal developments covered in *Concurrences* that have arisen in response to the growth of the digital economy. It may well be that the very growth of this sector is a reason *not* to apply some of the antitrust responses described here. Or we could eventually find that these responses are not strong or expansive enough in the face of the growth of large digital firms. These are important questions—perhaps the most important ones. We express the hope that an account like the one we offer with this Foreword might provide some perspective with which to understand better, and make more considered judgments about, the direction of competition law and policy in the years ahead. The developments we describe here seem likely to constitute the leading edge of future debates over competition and consumer protection regulation in the digital or algorithmic economy.

To date, debate over legal and regulatory changes has tended to focus on governmental oversight of digital firms, whose growing size and business practices have given rise in some quarters to concerns that have implicated merger policies as well as policies of fair competition and consumer protection. In Part I of this Foreword, we detail some of the major legal changes or proposed changes that have targeted these new technology firms. These are the actions that have received most of the coverage in *Concurrences*—and likely because this is where most of the action has occurred so far in regulatory circles. Although many of the targeted digital firms deploy services that use algorithmic tools, competition authorities have not yet begun to regulate algorithmic services themselves as much as the firms that make use of them. And even though the specifics of some of the regulatory actions targeting digital firms can be said to be distinctive in their targeting of online and other digital businesses, many of the concerns underlying regulatory actions or proposals have been, to date, similar to those that have long applied to general business activity.

In Part II, we highlight an aspect of antitrust that might become truly novel in an increasingly algorithmic economy: the targeting of antitrust law and principles to actions driven by algorithms themselves. As algorithmic tools come to automate economic transactions and autonomously make business decisions, the object of governmental oversight may well shift from the traditional focus on human managers to machine ones—or perhaps to the human designers of machine-learning "managers." This is an emerging possibility which to date can be most saliently seen in the context of self-preferencing algorithms. Although antitrust enforcers appear thus far to target types of self-preferencing behaviors that have emanated from human decisions rather than fully independent algorithmic ones, it is not hard to conceive of a future in which AI autonomously drives business decisions in problematic, anticompetitive directions or that operate on their own to charge supracompetitive prices. The discussion in Part II points to concerns that antitrust regulators seem increasingly likely to confront in the future.

Finally, in the face of a future that seems likely to be dominated by algorithmic transformations throughout the economy, antitrust regulators can expect to face a growing need themselves to develop and rely upon artificial intelligence and other algorithmic tools. The idea of using digital algorithms to aid with antitrust policymaking and enforcement has received, as best we can tell, very little if any coverage in *Concurrences* over the last two years. But it seems to us that the possible use of algorithms by antitrust authorities is likely to represent the next frontier when it comes to the intersection of antitrust and algorithms. For that reason, in Part III, we sketch out the possibility that regulators themselves will need to decide whether or how to use algorithms as tools for improving governmental oversight of market activity. The transition to an algorithmic economy, in the end, not only raises new sources of concern about competition and consumer protection, but may also provide government with new opportunities to advance the goals of fair and efficient competition.

I. Oversight of Digital Firms

The massive size of global digital firms has given rise to considerable angst among many policymakers and members of the public, with calls for more robust oversight by government antitrust authorities occurring around the world. [5] In response, some authorities have started to take action—whether for good or for ill. Over the last two years, these actions have tended to fall into two categories: (A) merger enforcement and regulation, and (B) policies intended to promote fair competition and consumer protection.

A. Merger Regulation

Some competition authorities appear to be moving toward broader enforcement of laws related to mergers and acquisitions, with the largest digital technology firms coming into regulators' crosshairs in important ways. Recent regulatory developments in jurisdictions around the world reflect an increased desire to scrutinize mergers and acquisitions by digital firms. Certain new and proposed rules have, for example, lowered thresholds of pre-merger notifications and increased the scrutiny of potential anticompetitive effects. Developments in the United Kingdom, Canada, China, and the United States are illustrative of changes which will undoubtedly have implications for digital technology firms.

1. U.K. Oversight of Digital Firms

In 2022, the U.K. government published a response to a 2021 consultation on a new competition regime aimed at proactively shaping the behavior of technology firms. [6] This announcement explained that the U.K.'s Competition and Markets Authority (CMA) had created a new Digital Markets Unit (DMU) that would seek to enforce antitrust rules against "a small number of firms with substantial and entrenched market power"—that is, those firms that possess what the U.K. authorities deem to be a strategic market status (SMS).

Although this announcement did not alter the threshold for government intervention in private mergers, it did create a mandatory reporting requirement to the CMA for significant transactions by SMS firms. Future legislation may set out specific conduct requirements for these firms to promote objectives of fair trading, open choices, and trust and transparency. The U.K. government's announcement also asserts that the DMU will have broad discretion to address the root causes of a firm's entrenched market power, such as through ownership separation remedies. The DMU could impose fines of up to 10 percent of a firm's global turnover, with an additional 5 percent for continued breaches.

2. Canadian Antitrust Regulatory Reform

In 2022, Canada's federal Ministry of Innovation, Science and Industry announced that it would review the Canadian Competition Act for potential reforms to modernize in response to the digital marketplace. [7] The announcement set forth potential changes to merger review by extending the limitation period for challenging mergers as well as lowering the threshold for pre-merger notification and scrutinizing the efficiencies defense to anticompetitive mergers. The changes are also anticipated to account for labor issues and the impacts that mergers may have on workers. Canada also has suggested that future modifications may occur to rules governing unilateral conduct, such as by lowering the standard for anticompetitive conduct to an "appreciable risk" rather than a "likelihood of harm" in lessening competition. [8] Rules related to competitor collaboration—e.g., those prohibiting buy-side coordination, tacit collusion, and deceptive digital advertising—may be forthcoming as well. [9]

3. China's Anti-Monopoly Regulations

In 2023, China's State Administration for Market Regulation (SAMR) issued four regulations implementing amendments to its Anti-Monopoly Law. These four regulations address monopoly agreements, abuse of dominance, merger review, and administrative monopolies. [10] The portions of the new regulation related to mergers stand in contrast to those of EU antitrust rules in not providing a precise definition of a "controlling right," a key merger filing criterion. Although a prior draft had included the definition as "*the right to decide or veto the appointment/dismissal of senior management, the financial budget, or the business plan*," the final merger regulation only provides general guidance that calls for consideration of factors such as "*transaction purpose, changes in shareholding structure, voting rights, appointment of senior management, agreements to act in concert, material commercial relationships and cooperation agreements.*" [11]

4. Draft Merger Guidelines in the United States

Most recently, in July 2023, the U.S. Department of Justice and Federal Trade Commission (FTC) released Draft Merger Guidelines for public comment. These guidelines, which would replace the previous 2010 Horizontal Merger Guidelines and 2020 Vertical Merger Guidelines, would apply across the board to all firms, but they will also certainly hold implications for digital firms. [12] The Draft Merger Guidelines themselves acknowledge the growing importance of platform competition, distinct from traditional market structures. [13] They set forth a series of thirteen core principles or guidelines, such as that mergers should not substantially lessen competition, significantly increase concentration in already highly concentrated markets, or entrench or extend a dominant position. [14] The draft indicates that when a merger involves a multi-sided platform, the agencies will examine competition between platforms, on a platform, or to displace a platform. Under certain circumstances, the agencies would also examine whether a merger might substantially lessen competition for workers.

B. Fair Competition and Consumer Protection

In addition to changing or proposing changes to merger policies, global competition authorities have grappled with other consumer- and competitor-related concerns stemming from dominant digital technology and platform firms. Some competition authorities have taken actions in the name of consumer protection. In a complaint filed in federal court in June, 2023, for example, the U.S. FTC filed suit against Amazon over allegations related to its marketing of and cancellation mechanism for Amazon Prime. [15] The FTC alleges that "*Amazon has knowingly duped millions of consumers into unknowingly enrolling in Amazon Prime [through] manipulative, coercive, or deceptive user-interface designs known as 'dark patterns' to trick consumers into enrolling in automatically-renewing Prime subscriptions.*" [16] These sorts of dark patterns—although likely enhanced by the digital nature of the platform—boil down to marketing concepts akin to those historically addressed by antitrust regulators.

Other legislators and regulators have adopted or proposed sector-specific or problem-specific legal changes. The European Parliament, for example, has been particularly active in adopting or considering new laws related to the digital and algorithmic economy. In addition to putting forward a series of regulations or proposals related to cybersecurity, data governance, artificial intelligence, and fair access to and use of data, [17] the European Parliament in 2022 adopted a Digital Services Act (DSA) and a Digital Markets Act (DMA). [18] The new DSA and DMA aim to address a range of regulatory concerns posed by digital marketplaces and to set guidelines for tech companies as they do business in the European Union. [19] The two acts were formally adopted by the European Parliament in May 2022 and later affirmed by the European Council. [20] The DMA entered into force in November 2022 and began applying in May 2023. [21] The DSA also entered into force in November 2022 and will generally start to apply beginning in February 2024. [22]

1. EU Digital Services Act

The DSA seeks to set clearer obligations for digital service providers that store and disseminate information to the public. These measures include new obligations for platforms to react to online illegal content uploaded by users—although the DSA does maintain an exemption of liability for service providers. The DSA also includes provisions related to traceability, consumer protection audits, increased transparency on algorithms for content moderation, and prohibitions on misleading practices and targeted advertising to children. [23] The DSA also asserts that large online platforms with over 45 million monthly active users have influence on online safety, public opinion, and online commerce, and thus it subjects them to stricter obligations to mitigate these types of systemic risks. [24]

2. Digital Markets Act

The DMA sets ground rules for large digital platforms. It designates some platforms as "gatekeepers" subject to increased scrutiny. [25] Gatekeepers are platforms that have a "significant impact" on the internal market, provide a "core platform service" for business users to reach end users, and hold or are expected to hold an "entrenched and durable position" in the market. [26] The DMA lists 10 "core" platform services covered by the law: online intermediation services, online search engines, online social networking services, video-sharing platform services, messenger services, operating systems, cloud computing services, online advertising services, web browsers, and virtual assistants. [27] If companies perform any of these services, they are required to self-verify whether they also have a "significant impact" on and an "entrenched and durable position" in the market. The European Commission will then seek to confirm these self-verifications by reviewing the size of the provider, number of business users and end users, potential barriers to entry, economics of scale, and structural market characteristics to make a decision about whether a company constitutes a gatekeeper and is subject to additional regulations. In September 2023, the Commission designated six companies—Alphabet, Amazon, Apple, ByteDance, Meta, and Microsoft—as gatekeepers that must comply with DMA obligations. [28]

Gatekeeper platforms, for example, are obligated to comply with extensive interoperability obligations and standards designed to allow business users to access the data they generate on the platform. They must also inform the Commission about intended acquisitions and mergers and allow business users to access the platform's services on fair, reasonable, and non-discriminatory terms. [29] Gatekeeper platforms are prohibited from self-preferencing their own services on their platforms as well as from preventing end users from easily un-installing software or applications. These platforms are not allowed to process users' data for targeted advertising without their explicit consent, and they cannot prevent business users from offering the same products to end users through third-party platforms at better terms and conditions. [30]

To enforce its provisions, the DMA allows the Commission to "*require access to any data and algorithms of undertakings and information about testing, as well as requesting explanations of them.*" [31] The DMA also provides for third parties to inform the Commission or even to bring a private enforcement action as to any practice or behavior by gatekeepers that falls within the scope of the DMA. [32] The Commission can impose fines of up to 10 percent of the gatekeeper's global turnover or up to 20 percent in cases of repeated non-compliance.

II. Antitrust Against Algorithms

In a variety of domains, it is becoming increasingly evident that certain kinds of algorithms can operate in what is essentially an autonomous manner. Advances in computing power and capacity, combined with access to large volumes of data, are increasingly fueling applications based on machine learning. These autonomously learning

algorithms are raising questions about the future of the economy and the role of humans in it. With the release of ChatGPT in the fall of 2022, for example, AI captured the world's attention, raising concerns about the eventual displacement of humans in a variety of professions from law to business.

When it comes to competition law and policy, it is clear that the machine-learning algorithms that drive AI applications might sometimes facilitate, if not even exacerbate, certain kinds of anti-competitive market conduct, including "*collusion, oligopolistic coordination, high unilateral prices, price discrimination, predation, selective pricing, ... and reducing the interoperability of datasets.*" [*33*] Eventually, these algorithms themselves might autonomously pursue and engage in this troubling conduct, even without being expressly programmed to do so by humans. As a result, in addition to seeing regulators around the world impose new policies on the digital firms that have become the leaders in developing products and services that run on algorithms, we also see officials taking an interest in overseeing the algorithms themselves and monitoring the roles they may play in reducing competition or creating other market problems.

Significantly, the U.K. government announced that its DMU will now be authorized to "*interrogate algorithms' impact on competition and require that firms carry out field trials (including A/B testing) to evaluate the impact of new innovations or processes if necessary.*" [*34*] The DMU will also be authorized to "*request compliance reports from SMS firms to assist their monitoring of compliance with the regime.*" Firms that fail to comply with these information requests may be subjected to fines of up to 1 percent of their global turnover—and even to have penalties imposed on senior managers or to have directors disqualified from future service on corporate boards in the United Kingdom. [*35*]

In the United States, antitrust authorities have acknowledged the role algorithms might play in exacerbating anticompetitive risks. Their Draft Merger Guidelines suggest concern about the use of pricing or monitoring algorithms, as the "*[u]se of algorithms or artificial intelligence to track or predict competitor prices or actions likewise increases the transparency of the market,*" which may allow rivals to respond more quickly and strongly through collusive algorithmic pricing. [*36*] Indeed, the Justice Department announced a policy shift towards increased scrutiny of information sharing and the use of pricing algorithms in the healthcare industry. [*37*] The Justice Department withdrew three previous policy statements that established a "safety zone" that industry surveys on prices and wages were unlikely to violate antitrust laws under certain circumstances. [*38*] Although this policy announcement was limited to healthcare surveys of reimbursement rates and other similar information, the Justice Department appears more generally to be willing to scrutinize the use of pricing algorithms that are capable of analyzing data and predicting competitors' strategies. [*39*]

In addition, a variety of other competition authorities have started to take aim at algorithms that either are programmed to, or autonomously learn to, engage in self-preferencing behavior. Self-preferencing itself is not typically a per se antitrust violation. It occurs whenever ranking algorithms permit a platform to favor its own products or services in a secondary market through favorable display and positioning. Legal decisions in several jurisdictions now appear to be providing some guidance on how to evaluate anticompetitive effects of algorithmic self-preferencing, beginning with targeting certain platform firms.

In November 2021, closing the chapter to a decade-long saga, the EU General Court upheld the European Commission's 2017 decision imposing a €2.4 billion penalty on Google for competition abuses related to Google Shopping. [*40*] The Commission had found that Google favorably positioned and displayed its own comparison-shopping service in its general search engine results pages, and that those of competing comparison-shopping services were prone to being demoted by adjustment algorithms. Google had promptly filed for annulment, arguing that its conduct had no anticompetitive effects. The Court rejected Google's argument, finding that, first, the unequal treatment of results was not justified by any pro-competitive service improvements in ranking generic results and, second, that Google had not demonstrated efficiency gains linked to that practice that would counteract negative

effects on competition. [*41*] Although the Court reasoned that the mere extension of a dominant position to an adjacent market did not itself constitute anticompetitive conduct, it accepted that Google's conduct fell outside the scope of competition on the merits. [*42*] Notably, the ruling represented a clarification by the high court that a platform's self-preferencing could still violate EU competition law even if it did not satisfy the strict requirements under *Bronner v. MediaPrint*'s "refusal to supply" doctrine (e.g., indispensability). [*43*]

The Court also rejected Google's proposed compliance mechanism. Google had characterized the Commission's concerns as ones about access to a design on Google's results pages known as "shopping units." [*44*] Accordingly, Google had chosen a remedy whereby rival comparison-shopping services would have access to the shopping units through an auction mechanism. Three years later, 130 companies and 28 industry associations signed an open letter arguing that if the Commission accepted Google's remedy as "equal treatment," then the Commission would run "*the risk of pre-defining and hence devaluing the meaning of any future legislative ban on self-preferencing.*" [*45*] In the General Court's 2021 decision, it clarified that the proper inquiry concerned Google's general search service by means of access to general results pages for competing comparison shopping services. In other words, Google must grant equal access to its general results page. [*46*]

Competition authorities in other countries have followed suit. Under a similar set of facts, in 2022, the Seoul High Court upheld the South Korean Fair Trade Commission's decision to sanction the local dominant comparison-shopping platform NAVER for leveraging its market dominance in e-commerce through algorithmic manipulation that favored NAVER's own open market service. [*47*] The South Korean Fair Trade Commission then promulgated Guidelines for Review of Abuse of Dominance by Online Platform Operators, warning of competition concerns created by self-preferencing algorithms. [*48*]

A few weeks later, the Polish Office of Competition and Consumer Protection likewise issued decisions imposing $210M PLN ($52M USD) in penalties on Poland's popular online shopping platform, Allegro, for unlawfully abusing its market position by favoring its own online store over its competitors. [*49*]

Of course, not all countries have moved in this direction. Notably, in 2013, the U.S. FTC had found that Google's practices at issue in the European case did not violate U.S. law prohibiting unfair methods of competition. [*50*] In 2021, the Turkish Competition Authority rejected allegations that a Turkish online food delivery platform penalized restaurants that worked with competing platforms by reducing their visibility, ratings, and advertisement access. [*51*]

Although many legal developments over the last two years center on digital services that have not been complicated by algorithmic self-preferencing, competition authorities have signaled a willingness to impose harsher restrictions on self-preferencing in the digital marketplace at large. An open question thus remains as to whether prohibitions or other limitations on self-preferencing will become the norm on the global stage. Moreover, even in those countries that adopt such restrictions, there will be questions about whether they reach beyond online shopping platforms. Antitrust regulators appear cognizant that self-preferencing behavior can appear in a variety of sectors. Companies involved in the internet of things (IoT), for example, may engage in self-preferencing in pre-installation, default-setting, and prominent placement of consumer IoT services on smart devices or in relation to voice assistants. [*52*] Marketplaces have begun to deploy ranking algorithms that can further exacerbate a platform's influence over consumer purchasing decisions and rankings. [*53*]

Future litigation may arise in these other domains where algorithmic self-preferencing may arise. Overall, algorithmic business activity of all kinds may well spur a series of important new questions. When it comes to information-sharing between competitors, for example, existing rules have been developed with humans in mind as the regulatory target. Will current limits on information that may keep humans from collusive behavior be sufficient to protect against AI-driven collusion when machine-learning algorithms can find patterns in information that humans see as

totally unconnected to prices? Another interesting—even foundational question—will likely arise over whether an algorithm can itself commit an antitrust violation at all, at least under current rules that target antitrust obligations to "persons." [*54*] Should humans be held responsible at all if collusive behavior emerges autonomously from algorithms that have never been programmed or instructed to engage in such behavior? These are some of the questions that are likely to confront regulators and courts in an increasingly digitally based, algorithmic economy.

III. Algorithms for Antitrust

The bulk of the legal profession's attention to antitrust and algorithms has focused on how competition authorities should respond to market activity by digital firms or by the algorithms that private firms deploy. But algorithms can and ought to be of interest to lawyers and antitrust regulators also because of the ways that they may improve governmental oversight of market behavior. [*55*] With more of the private sector relying on artificial intelligence and other digital tools than ever before, it only makes sense that regulators also need to start relying on similar tools, if for no reason than simply to keep pace with the increasing speed and subtlety of private market activity. [*56*]

In other regulatory domains, government officials have started to harness the power of artificial intelligence tools to improve their performance. In the face of the great number of regulated entities and complex transactions—more than a government agency has capacity and staff to monitor at all times [*57*]—a common and perennial challenge facing regulators has been deciding how to allocate limited monitoring and enforcement capabilities to their greatest effect. To address this challenge, regulators in other domains have started to rely on artificial intelligence. For example, tax authorities have begun to use machine-learning algorithms to unearth tax malfeasance, and securities regulators are starting to use similar algorithmic tools to detect where fraudulent transactions are likely to have occurred. [*58*] One research study has shown that environmental regulators can use artificial intelligence to enhance their ability to identify water quality violators by a staggering 600 percent. [*59*]

Competition regulators are inevitably confronted with a similar challenge. The volume of transactions and firms that could be involved in anticompetitive behavior at any one time far exceeds any regulator's capacity for direct monitoring and enforcement. Contemporary machine-learning techniques offer the potential for these antitrust organizations to pinpoint questionable practices and thereby more efficiently deploy their intrinsically limited oversight resources.

In the face of both the longstanding problem of simply being outnumbered as well as the many new challenges created by private sector reliance on algorithms, antitrust authorities must seek to improve their own data analytic capacities if they are to be agile and vigilant in protecting consumers in an increasingly algorithmic economy. Some antitrust regulators are starting to take note. The U.S. Department of Justice's Antitrust Division has indicated that it is seeking to expand its "*capabilities and engagement in emerging technologies relevant to antitrust enforcement.*" [*60*] The U.K. Competition and Markets Authority has indicated that it is taking an interest in machine learning algorithms. [*61*] And in 2023, the Chinese SAMR indicated that it intends to explore the use of technical means to promote "smart supervision," potentially aiming to automate merger control through online-monitoring systems to detect certain transactions by companies. [*62*]

Taking full advantage of new algorithmic tools—and using them responsibly—will be a significant challenge facing antitrust authorities in the future. [*63*] They will need to develop their own sufficient in-house capacity to use algorithmic tools or find and adequately supervise third-party contractors. [*64*] No matter where they find the expertise in data analytics, regulators will also need to be able to specify clear objectives for their algorithms, and they will need both adequate and timely data and sufficient computing hardware and data storage capabilities. They

will need to address cybersecurity along with protection of private and confidential business information. Lastly, antitrust regulators will need to establish auditing and validation practices to ensure that their tools are working as intended and are free of untoward bias. [*65*]

Conclusion

We live in a global economy that is increasingly based on digital algorithms. Antitrust regulators today and in the future will be, in important ways, regulators of algorithms: overseeing the firms that use them and, because certain types of algorithms can autonomously drive market behavior, scrutinizing algorithms themselves. In some cases, vigilant enforcement of existing antitrust laws will be needed. And in other cases, new laws and regulations will likely be needed too.

As the pages of this *Concurrences* special issue demonstrate, regulators around the world are assuming a role as overseers of the growing algorithmic economy, raising important questions about what role antitrust should exactly play in response to digital technology firms. Although we have taken no position here on that question, the sampling of new laws and regulatory proposals we have highlighted in this Foreword does reveal that an array of competition and consumer protection authorities are starting to develop answers for themselves and for the members of the public who they serve. At present, although the technologies these regulators confront are certainly new, the goals adopted by regulators are often quite familiar: combatting inefficiencies and protecting consumers' welfare.

Achieving these and other regulatory objectives in the future will call for ongoing vigilance. As important as it may sometimes be to create new rules or take high-profile enforcement actions, antitrust authorities, like other regulators, cannot expect any one action to be decisive in solving all problems that are emerging in the digital and algorithmic transformation that lies ahead. The success of antitrust in the algorithmic economy will surely depend on governmental authorities' continuous efforts at improvement for years to come and their ability to remain agile and aware in the face of a highly dynamic world.

Note from the Editors: although the e-Competitions editors are doing their best to build a comprehensive set of the leading EU and national antitrust cases, the completeness of the database cannot be guaranteed. The present foreword seeks to provide readers with a view of the existing trends based primarily on cases reported in e-Competitions. Readers are welcome to bring any other relevant cases to the attention of the editors.

[*1*] Ian Bremmer & Mustafa Suleyman, *The AI Power Paradox*, Foreign Affairs (2023), *https://www.foreignaffairs.com/world/artificial-intelligence-power-paradox* ⬈; Klaus Schwab, The Fourth Industrial Revolution (2016).

[*2*] Cary Coglianese & Alicia Lai, *Antitrust by Algorithm*, 2 Stan. J. Computational Antitrust 1 (2022); Thibault Schrepel, *Computational Antitrust: An Introduction and Research Agenda* , 1 Stan. J. Computational Antitrust (2021); Cary Coglianese & David Lehr, *Regulating by Robot: Administrative Decision Making in the Machine-Learning Era*, 105 Geo. L. J. 1147 (2017).

[*3*] U.S. Central Intelligence Agency, The World Factbook, *https://www.cia.gov/the-world-*

factbook/field/internet-users/ (last accessed on Aug. 31, 2023) (reporting an estimated 66 percent of the world as connected to the internet in 2022); Global System for Mobile Communications Association, Data, *https://www.gsmaintelligence.com/data/* (last accessed on Aug. 31, 2023) (showing that, in the third quarter of 2023, the world had approximately 5.6 billion "unique mobile subscribers," or around 70 percent of the population).

[4] Reuters, *Apple, Microsoft Remain World's Top 2 Companies by Market Cap* (Aug. 1, 2023), *https://www.reuters.com/technology/global-markets-marketcap-2023-08-01/*.

[5] Of course, firm size by itself is not necessarily the metric by which to apply antitrust law remedies. See e.g., Herbert Hovenkamp, *Antitrust and Platform Monopoly*, 130 Yale L. J. 1952 (2021). But the way that some firms reach their size—such as if they use mergers and acquisitions to swallow up their competitors—can certainly be cause for antitrust concern. *Id.*

[6] U.K. Department for Business, Energy, & Industrial Strategy, New Pro-Competition Regime for Digital Markets - Government Response to Consultation (May 6, 2022), *https://www.gov.uk/government/consultations/a-new-pro-competition-regime-for-digital-markets/outcome/a-new-pro-competition-regime-for-digital-markets-government-response-to-consultation*. See **Stephen Wisking, André Pretorius, Kristien Geeurickx, Peter Rowland**, *The UK Government publishes its proposals for a new pro-competition regime in digital markets, 6 May 2022, e-Competitions May 2022, Art. N° 106824*.

[7] See **Mark Katz**, **Charles Tingley**, **Jim Dinning**, **Dajena Pechersky**, *The Canadian Government opens consultation on its proposed far-reaching reforms to the national competition regime, 17 November 2022, e-Competitions November 2022, Art. N° 110052*.

[8] *Id.*

[9] *Id.*

[10] See **Adrian Emch**, **Qing Lyu**, *The Chinese State Administration for Market Regulation enacts the final implementing regulations for the amended Anti-Monopoly Law, 24 March 2023, e-Competitions March 2023, Art. N° 112005*; and **Frances Xu**, **Adelaide Luke**, **Howard Chan**, **Hazel Xu**, *The Chinese State Administration for Market Regulation issues four updates to the final implementing guidelines for the amended Anti-Monopoly Law, 24 March 2023, e-Competitions March 2023, Art. N° 112380*.

[11] *Id.*

[12] U.S. Department of Justice Antitrust Division, 2023 Draft Merger Guidelines (2023), *https://www.justice.gov/atr/d9/2023-draft-merger-guidelines*. See, e.g., **US Department of Justice Antitrust Division**, *The US DOJ and FTC seek public comments on the draft updates of the Merger Guidelines, 19 July 2023, e-Competitions July 2023, Art. N° 113257*; **US Federal Trade Commission**, *The US FTC and DOJ release the draft Merger Guidelines and welcome public comments on the Guidelines, 19 July 2023, e-Competitions July 2023, Art. N° 113258*; and **Maria Raptis**, **Kenneth Schwartz**, **David Wales**, *The US FTC and DOJ release a draft of the proposed merger guidelines which aims to change the merger enforcement landscape in the US, 19 July 2023, e-Competitions July 2023, Art. N° 113264*.

[13] *Id.*

[14] *Id.*

[15] Federal Trade Commission v. Amazon.com, Inc., 2:23-cv-0932 (June 21, 2023), *https://storage.courtlistener.com/recap/gov.uscourts.wawd.323520/gov.uscourts.wawd.323520.1.0_1.pdf* ⬈.

[16] Federal Trade Commission, Press Release, FTC Takes Action Against Amazon for Enrolling Consumers in Amazon Prime Without Consent and Sabotaging Their Attempts to Cancel (June 21, 2023), *https://www.ftc.gov/news-events/news/press-releases/2023/06/ftc-takes-action-against-amazon-enrolling-consumers-amazon-prime-without-consent-sabotaging-their* ⬈.

[17] See, e.g., **Camille Paulhac, Pierre Kirch, Juliette Hua, Jason Raeburn**, *The EU Parliament adopts the Digital Services Act and the Digital Markets Act making the EU the first jurisdiction in the world to set a standard for regulating the digital space, 5 July 2022, e-Competitions July 2022, Art. N° 109147*; **Antonis Giannakodimos, Nefeli Apostolopoulou,** *The EU Parliament adopts the Digital Services Act and the Digital Markets Act, introducing new rules for tech companies and digital platforms, 5 July 2022, e-Competitions July 2022, Art. N° 108378*; and **Henry Mostyn, Bianca Buzatu, Xavier Quer Zamora**, *The EU Parliament approves the final text of the Digital Markets Act, 5 July 2022, e-Competitions July 2022, Art. N° 107417.*

[18] See E.U. Digital Services Act, *https://www.europarl.europa.eu/doceo/document/TA-9-2022-07-05_EN.html#sdocta1* ⬈; E.U. Digital Markets Act, *https://www.europarl.europa.eu/doceo/document/TA-9-2022-07-05_EN.html#sdocta2* ⬈. See, e.g., **Camille Paulhac, Pierre Kirch, Juliette Hua, Jason Raeburn**, *The EU Parliament adopts the Digital Services Act and the Digital Markets Act making the EU the first jurisdiction in the world to set a standard for regulating the digital space, 5 July 2022, e-Competitions July 2022, Art. N° 109147*; **Antonis Giannakodimos, Nefeli Apostolopoulou,** *The EU Parliament adopts the Digital Services Act and the Digital Markets Act, introducing new rules for tech companies and digital platforms, 5 July 2022, e-Competitions July 2022, Art. N° 108378*; and **Henry Mostyn, Bianca Buzatu, Xavier Quer Zamora**, *The EU Parliament approves the final text of the Digital Markets Act, 5 July 2022, e-Competitions July 2022, Art. N° 107417.*

[19] See, e.g., **Antonis Giannakodimos, Nefeli Apostolopoulou,** *The EU Parliament adopts the Digital Services Act and the Digital Markets Act, introducing new rules for tech companies and digital platforms, 5 July 2022, e-Competitions July 2022, Art. N° 108378*; **Camille Paulhac, Pierre Kirch, Juliette Hua, Jason Raeburn**, *The EU Parliament adopts the Digital Services Act and the Digital Markets Act making the EU the first jurisdiction in the world to set a standard for regulating the digital space, 5 July 2022, e-Competitions July 2022, Art. N° 109147*; and **Henry Mostyn, Bianca Buzatu, Xavier Quer Zamora**, *The EU Parliament approves the final text of the Digital Markets Act, 5 July 2022, e-Competitions July 2022, Art. N° 107417.*

[20] *Id.*

[21] European Commission, Questions and Answers: Digital Markets Act: Ensuring Fair and Open Digital Markets (July 7, 2023), *https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_2349* ⬈.

[22] Digital Services Act (DSA), *https://www.eu-digital-services-act.com* ⬈ ("This Regulation will apply from 17 February 2024 (according to Article 93, Entry into force and application). Some provisions apply from 16 November 2022."). See, e.g., **Filippo Frigerio, Luca Russo,** *The EU Parliament and Council see the Digital Services Act enter into force, 19 October 2022, e-Competitions October 2022, Art. N° 111177*; **Kyriakos Fountoukakos, Daniel Vowden, Peter Rowland, Laura Zsarnai, Violetta Meli**, *The EU Commission publishes the ground-breaking Digital Markets Acts which aims at improving the contestability and fairness of digital markets, 1 November 2022, e-Competitions*

November 2022, Art. N° 112428; and **Christina Renner,** *The EU Commission sees its Digital Markets Act enter into force laying the groundwork for competition enforcement against so-called "gatekeepers," 1 November 2022, e-Competitions November 2022, Art. N° 109701.*

[**23**] *Id.*

[**24**] **Camille Paulhac, Pierre Kirch, Juliette Hua, Jason Raeburn , Antonis Giannakodimos, Nefeli Apostolopoulou, Henry Mostyn, Bianca Buzatu, Xavier Quer Zamora** *supra* note 17.

[**25**] EU Digital Markets Act (DMA), *https://eur-lex.europa.eu/legal-content/EN/TXT/? uri=CELEX%3A32022R1925* ⌁. See, e.g., **Christina Renner***, The EU Commission sees its Digital Markets Act enter into force laying the groundwork for competition enforcement against so-called "gatekeepers," 1 November 2022, e-Competitions November 2022, Art. N° 109701;* **Saira Henry, Douglas Lahnborg, Boris Marschall***, The EU Parliament sees its Digital Markets Act enter into force and start the clock on the application of game-changing rules for Big Tech, 1 November 2022, e-Competitions November 2022, Art. N° 109421;* and **Dr. Ann-Christin Richter,** *The EU Commission see its Digital Markets Act enter into force and therefore increased antitrust scrutiny of Big Tech firms, 1 November 2022, e-Competitions October 2022, Art. N° 109676.*

[**26**] DMA, Art. 3, *supra* note 25. For important analysis applying U.S. antitrust principles to gatekeepers, see Herbert Hovenkamp, *Gatekeeper Competition Policy*, Mich. Tech. L. Rev. (forthcoming 2023).

[**27**] **Renner, Saira Henry, Douglas Lahnborg, Boris Marschall,** *and* **Dr. Ann-Christin Richter** *supra* note 25.

[**28**] European Commission, Press Release, *Digital Markets Act: Commission designates six gatekeepers* (Sept. 6, 2023), *https://ec.europa.eu/commission/presscorner/detail/en/ip_23_4328* ⌁. See, e.g., **European Commission***, The EU Commission designates six gatekeepers under the Digital Markets Act (Alphabet / Amazon / Apple / ByteDance / Meta / Microsoft), 6 September 2023, e-Competitions September 2023, Art. N° 113966;* **Ana Hergouth***, The EU Commission designates the first set of gatekeepers with compliance responsibilities under the Digital Markets Act (Alphabet / Amazon / Apple / ByteDance / Meta / Microsoft), 6 September 2023, e-Competitions Preview, Art. N° 114086;* and **Thomas Graf, Robbert Snelders, Henry Mostyn, Sabrina Apitz-Grossman, Conor Opdebeeck-Wilson, Bianca Buzatu,** *The EU Commission designates the first set of gatekeepers under the Digital Markets Act (Alphabet / Amazon / Apple / ByteDance / Meta / Microsoft), 6 September 2023, e-Competitions September 2023, Art. N° 113974.*

[**29**] **Antonis Giannakodimos, Nefeli Apostolopoulou, Camille Paulhac, Pierre Kirch, Juliette Hua, Jason Raeburn, Henry Mostyn, Bianca Buzatu, Xavier Quer Zamora** *supra* note 19.

[**30**] *Id.*

[**31**] EU Digital Markets Act, *https://eur-lex.europa.eu/legal-content/EN/TXT/? uri=CELEX%3A32022R1925* ⌁. See, e.g., **Christina Renner***, The EU Commission sees its Digital Markets Act enter into force laying the groundwork for competition enforcement against so-called "gatekeepers," 1 November 2022, e-Competitions November 2022, Art. N° 109701;* **Saira Henry, Douglas Lahnborg, Boris Marschall***, The EU Parliament sees its Digital Markets Act enter into force and start the clock on the application of game-changing rules for Big Tech, 1 November 2022, e-Competitions November 2022, Art. N° 109421;* and **Dr. Ann-Christin Richter,** *The EU Commission see its Digital Markets Act enter into force and therefore increased antitrust scrutiny of Big Tech firms, 1 November 2022, e-Competitions October 2022, Art. N° 109676.*

[32] See, e.g., **Kyriakos Fountoukakos, Daniel Vowden, Peter Rowland, Nika Nonveiller, Violetta Meli,** *The EU Parliament publishes the Digital Markets Act in the Official Journal, creating a new regulatory regime for large tech platforms, 12 October 2022, e-Competitions October 2022, Art. N° 109335;* **Henry Mostyn, Nuna Van Belle, Xavier Quer Zamora,** *The EU Parliament publishes the Digital Markets Act in the Official Journal, 12 October 2022, e-Competitions October 2022, Art. N° 109286;* and **Ingrid Vandenborre, Bill Batchelor, Frederic Depoortere, Aurora Luoma, Giorgio Motta,** *The EU Parliament publishes the Digital Markets Act in the Official Journal, creating new regulatory regime for large tech platforms, 12 October 2022, e-Competitions October 2022, Art. N° 109153.*

[33] Michal S. Gal & Daniel L. Rubinfeld, *Algorithms, AI and Mergers*, Antitrust Law Journal (forthcoming), *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4469586* . See also Michal Gal, *Can We Limit Algorithmic Coordination?*, ProMarket (July 18, 2023), *https://www.promarket.org/2023/07/18/can-we-limit-algorithmic-coordination/?mc_cid=d8617a35f9&mc_eid=ddd20d7c43* ; Cary Coglianese & Alicia Lai, *Antitrust by Algorithm*, 2 Stan. J. Computational Antitrust 1 (2022), *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3985553* .

[34] See **Stephen Wisking, André Pretorius, Kristien Geeurickx, Peter Rowland,** *The UK Government publishes its proposals for a new pro-competition regime in digital markets, 6 May 2022, e-Competitions May 2022, Art. N° 106824.*

[35] *Id.*

[36] *Id.*

[37] Press Release, Off. of Pub. Affs., Dep't of Just., Justice Department Withdraws Outdated Enforcement Policy Statements (Feb. 3, 2023), *https://www.justice.gov/opa/pr/justice-department-withdraws-outdated-enforcement-policy-statements* .

[38] Lauren N. Donahue & Brian J. Smith, *DOJ Antitrust Division Indicates Increased Scrutiny of Information Sharing and Use of Pricing Algorithms*, K&L Gates (Feb. 15, 2023), *https://www.klgates.com/DOJ-Antitrust-Division-Indicates-Increased-Scrutiny-of-Information-Sharing-Use-of-Pricing-Algorithms-2-15-2023* .

[39] *Id.*

[40] See, e.g., **General Court of the European Union,** *The EU General Court largely dismisses a Big Tech company's appeal against the Commission's decision finding it had abused its dominant position by favoring its own comparison shopping service (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 103428;* **Thomas Höppner**, *The EU General Court confirms the Commission's decision finding a Big Tech company guilty of abuse of dominance by favouring its own comparison shopping service on its general results pages (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 103639;* and **Andreas Reindl, Margot Vogels, Barbara Monti,** *The EU General Court confirms that "self-preferencing" by a Big Tech company can infringe Article 102 TFEU (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 104627.*

[41] See, e.g., **General Court of the European Union,** *The EU General Court largely dismisses a Big Tech company's appeal against the Commission's decision finding it had abused its dominant position by favoring its own comparison shopping service (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 103428;* **Thomas Höppner**, *The EU General Court confirms the Commission's decision finding a Big Tech company guilty of abuse of dominance by favouring its own comparison shopping service on its general results pages (Google Shopping), 10 November 2021,*

e-Competitions November 2021, Art. N° 103639; and **Andreas Reindl, Margot Vogels, Barbara Monti,** *The EU General Court confirms that "self-preferencing" by a Big Tech company can infringe Article 102 TFEU (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 104627.*

[**42**] See, e.g., **Dimitrios Katsifis,** *The EU General Court delivers judgment which confirms the Commission's decision and finds a Big Tech guilty for abuse of dominance by favouring its own comparison shopping services on its general result pages (Google shopping), 10 November 2021, e-Competitions Algorithms & Antitrust, Art. N° 108828*; **Frédéric Pradelles, Mary Hecht,** *The EU General Court confirms Commission's decision to fine a Big Tech company for abusing its dominant position in online search by discriminating against comparison shopping services to favour its own offering (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 106676*; and **General Court of the European Union,** *The EU General Court largely dismisses a Big Tech company's appeal against the Commission's decision finding it had abused its dominant position by favoring its own comparison shopping service (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 103428.*

[**43**] Edmon O'Hanlon, *Refusal to Supply Jurisprudence in European Competition Law since Oscar Bronner*, 9 Trinity C.L. Rev. 156 (2006), *https://heinonline.org/HOL/LandingPage?handle=hein.journals/trinclr9&div=14&id=&page=* ↗.

[**44**] See, e.g., **Thomas Höppner,** *The EU General Court confirms the Commission's decision finding a Big Tech company guilty of abuse of dominance by favouring its own comparison shopping service on its general results pages (Google Shopping), 10 November 2021, e-Competitions Algorithms & Antitrust, Art. N° 103639*; **General Court of the European Union,** *The EU General Court largely dismisses a Big Tech company's appeal against the Commission's decision finding it had abused its dominant position by favoring its own comparison shopping service (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 103428*; and **Thomas Höppner, Anna Morfey, Lesley Hannah, Stella Gartagani, Kio Gwilliam, Philipp Westerhoff, Johannes Wick, Maximilian Volmar, Ami Ndukwe,** *The EU General Court upholds a €2.42B fine imposed on a Big Tech company and dismisses an appeal against the Competition Authority's decision (Google Shopping), 10 November 2021, e-Competitions November 2021, Art. N° 103913.*

[**45**] Open Letter, *https://www.enpa.eu/policy-issues/joint-industry-letter-against-googles-self-preferencing* ↗.

[**46**] **Thomas Höppner, Anna Morfey, Lesley Hannah, Stella Gartagani, Kio Gwilliam, Philipp Westerhoff, Johannes Wick, Maximilian Volmar, Ami Ndukwe,** *supra* note 44. In 2022, the European Parliament solidified this approach by including self-preferencing provisions in Article 6(5) of the DMA, as noted above. Article 6(5) provides as follows: "The gatekeeper shall not treat more favourably, in ranking and related indexing and crawling, services and products offered by the gatekeeper itself than similar services or products of a third party. The gatekeeper shall apply transparent, fair and non-discriminatory conditions to such ranking." E.U. Digital Markets Act, *supra* note 18.

[**47**] See **Sangyun Lee**, *The Seoul High Court upholds the South Korean Fair Trade Commission's decision to sanction "self-preferencing" as an abuse of dominance (NAVER shopping), 14 December 2022, e-Competitions Algorithms & Antitrust, Art. N° 112163.*

[**48**] Platform Guidelines, *https://competition.tistory.com/entry/platformguidelines20230112* ↗; Lee, *supra* note 46.

[**49**] See **Polish Competition Authority**, *The Polish Competition Authority fines the nation's largest online trading platform for favoring its own downstream online store (Allegro), 29 December 2022, e-Competitions Algorithms & Antitrust, Art. N° 110457.*

[**50**] See, e.g., Charles Arthur, *Google Cleared of Search Results Bias After Two-Year Investigation*, The Guardian (Jan. 4, 2013), *https://www.theguardian.com/technology/2013/jan/03/google-cleared-search-bias-investigation* ⬈.

[**51**] See **Gönenç Gürkaynak, Fırat Eğrilmez,** *The Turkish Competition Authority rejects an allegation that an online food delivery company has abused its dominant position through most favoured customer practices and de facto exclusivity (Yemek Sepeti), 18 May 2022, e-Competitions Algorithms & Antitrust, Art. N° 110461.*

[**52**] See, e.g., **Enzo Marasà, Irene Picciano,** *The EU Commission publishes its final report closing the sector inquiry on the consumer 'Internet of Things', 20 January 2022, e-Competitions January 2022, Art. N° 105455;* **European Commission,** *The EU Commission publishes its final report on the consumer 'Internet of Things' sector inquiry, 20 January 2022, e-Competitions January 2022, Art. N° 104757;* and **Margot Vogels, Andreas Reindl,** *The EU Commission publishes its final report on the consumer Internet of Things ahead of the final "DMA" negotiations, indicating material competition concerns in digital assistant markets, 20 January 2022, e-Competitions January 2022, Art. N° 104993.*

[**53**] **Australian Competition Authority**, *The Australian Competition Authority issues a report examining the operation of general online marketplaces, 28 April 2022, e-Competitions Algorithms & Antitrust, Art. N° 106560.*

[**54**] See 15 U.S.C. §§7, 12(b) (stating that the antitrust laws apply to a "person" or "persons," including humans, corporations, and associations). Notably, in other legal domains courts have held that humans are the necessary and proper objects of the law. See, e.g., Thaler v. Vidal, 43 F.4th 1207 (Fed. Cir. 2022) (holding that an inventor must be a human "individual"); Thaler v. Perlmutter, No. 22-1564 (BAH) (D.D.C. Aug. 18, 2023), *https://www.scribd.com/document/665871482/Thaler-v-Perlmutter#* ⬈ (holding that human authorship is essential to make a valid legal claim for copyright protection).

[**55**] Cary Coglianese, *AI For the Antitrust Regulator*, ProMarket (June 6, 2023), *https://www.promarket.org/2023/06/06/ai-for-the-antitrust-regulator/* ⬈.

[**56**] Cary Coglianese, *Optimizing Regulation for an Optimizing Economy*, 4 U. Pa. J. L. & Pub. Affrs. 1 (2018).

[**57**] Cary Coglianese, *The Challenge of Regulatory Excellence*, in Cary Coglianese, ed., Achieving Regulatory Excellence 1 (2017). Of course, one prerequisite for regulatory success in the face of even the inherent asymmetries of numbers that regulatory authorities confront is adequate funding to hire and train staff and secure needed technologies to support their efforts. See, e.g., Barry Barnett, *Antitrust Enforcers Must Have More Funding*, Law360 (July 7, 2023), *https://www.susmangodfrey.com/wp-content/uploads/2023/07/Antitrust-Enforcers-Must-Have-More-Funding.pdf* ⬈; Shelley H. Metzenbaum & Gaurav Vasisht, *What Makes a Regulator Excellent? Mission, Funding, Information, and Judgment*, in Cary Coglianese, ed., Achieving Regulatory Excellence 148 (2017). As has been noted, "a lot seems to come down to resources: 'the bigger a government's competition budget, the better the enforcement agency gets.'" Cary Coglianese, Listening, Learning, and Leading: A Framework for Regulatory Excellence 64 (2015), *https://kleinmanenergy.upenn.edu/wp-content/uploads/2020/08/Listening-Learning-Leading_Coglianese-1.pdf* ⬈ (quoting Global Competition Review, *Rating Enforcement 2015*) (June 18, 2015).

[**58**] Coglianese & Lehr, *Regulating by Robot, supra* note 2.

[**59**] Miyuki Hino, Elinor Benami & Nina Brooks, *Machine Learning for Environmental Monitoring*, 1 Nature Sustainability 583 (2018).

[**60**] U.S. Department of Justice, *Justice Department Joins Computational Antitrust Project at Stanford Law School* (Jan. 19, 2021), *https://www.justice.gov/opa/pr/justice-department-joins-computational-antitrust-project-stanford-law-school* ⌐.

[**61**] Coglianese & Lai, *Antitrust by Algorithm, supra* note 2, at 11–12.

[**62**] See **Adrian Emch, Qing Lyu**, *The Chinese State Administration for Market Regulation enacts the final implementing regulations for the amended Anti-Monopoly Law, 24 March 2023, e-Competitions Algorithms & Antitrust, Art. N° 112005*; and **Frances Xu, Adelaide Luke, Howard Chan, Hazel Xu,** *The Chinese State Administration for Market Regulation issues four updates to the final implementing guidelines for the amended Anti-Monopoly Law, 24 March 2023, e-Competitions March 2023, Art. N° 112380.*

[**63**] Cary Coglianese & Alicia Lai, *Assessing Automated Administration*, in Justin Bullock et al., eds., Oxford Handbook of AI Governance (forthcoming), *https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4084844* ⌐.

[**64**] See, e.g., Cary Coglianese & Erik Lampmann, *Contracting for Algorithmic Accountability*, 6 Admin. L. Rev. 175 (2021); David S. Rubenstein, *Acquiring Ethical AI*, 73 Florida L. Rev. 747 (2021).

[**65**] See, e.g., Nat'l Inst. of Standards & Tech., NIST AI 100-1, Artificial Intelligence Risk Management Framework (AI RMF 1.0) (2023); Gov't Accountability Off., Artificial Intelligence: An Accountability Framework for Federal Agencies and Other Entities, GAO-21-519SP (June 2021). See generally Cary Coglianese & Alicia Lai, *Algorithm vs. Algorithm*, 72 Duke L.J. 1281 (2022).