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ANTITRUST'S AI REVOLUTION

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ANTITRUST'S AI REVOLUTION

DARYL LIM*

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Antitrust law operates like an algorithm. Its lodestar, the rule of reason, is a black box. Unlike most other areas of the law, judges, not Congress, write the rules and sometimes in surprisingly capricious ways. These rules govern everything from Google and Facebook's "killer acquisitions" to vaccine development agreements during a

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pandemic. Injecting artificial intelligence (AI) into antitrust analysis seems prosaic, but in fact, it is revolutionary.

Courts routinely lean on ideology as a heuristic when they must interpret the rule of reason in light of economic theory and evidence. Chicago School conservatism reined in some excesses of earlier populist and structuralist movements, but it also hampered antitrust enforcement and systemically penalized plaintiffs. Scholars widely agree Chicagoan antitrust overshot its mark and failed to protect consumers against corporate hegemony. Widespread anxiety over excessive private power recently spawned a chorus of voices beckoning a return to antitrust law's populist past. None seem to realize the fix lies in embracing new technology rather than new ideology.

This Article bridges two dominant streams of antitrust scholarship for the first time. First, it shifts the focus from AI as a collusive threat to its potential as a forensic and predictive tool to build the rule of reason from the bottom-up based on big data and computing power rather than top-down with wonky ideology. Second, this new method of algorithmic adjudication presents a new normative paradigm to replace Chicagoan fears of judicial inaptitude and false positives with a truly evidence-based alternative, particularly when dealing with cases involving nascent acquisitions and intellectual property rights. In getting down to the brass tacks, this Article confronts well-known concerns with AI deployment—bias, accountability, and data availability. It explains that these concerns, while legitimate, can be significantly mitigated or, in some cases, comprehensively addressed. The Article concludes by reflecting on the broader implications of algorithmic adjudication beyond antitrust law by discussing atextualism in action, algoocracy and the common law, and the implications of plaintiff success to the rule of law.

INTRODUCTION

Many will remember 2020 as the year of antitrust law's rebirth. Congressional politics, network economics, missteps on privacy, and corporate hubris converged to catalyze a deep reassessment of antitrust law's ability to rein in excessive private power.¹ The last time Americans witnessed this level of bipartisan zeal in antitrust law was in 1890 when Congress scrambled to pass the Sherman Act as John D. Rockefeller and Andrew Carnegie's sprawling corporate trusts stifled competition in vital industrial sectors.²

1. See discussion *infra* Part I.B.

2. See 15 U.S.C. § 1 (2018) (prohibiting contracts, combinations, or conspiracies in restraint of trade); 15 U.S.C. § 2 (2018) (prohibiting those who monopolize or attempt to monopolize commerce).

Today, Google, Apple, Facebook, Amazon, and Microsoft are the largest U.S. public companies by market capitalization (see Figure 1, below).³ The Sherman Act sets competitive guideposts in a national economy increasingly threatened by the exercise of market power.⁴ Dominant platforms compete directly with the businesses that depend on them while acting as gatekeepers for billions of dollars in economic activity. With more companies relying on fewer digital platforms to trade, antitrust law's ability to address "killer acquisitions," the exercise of intellectual property rights, access to vaccines during the COVID-19 pandemic, and even more traditional sectors of the economy will impact us for decades to come.⁵ The stakes are, in a word, enormous.

3. See *50 Largest Companies by Market Cap Today (Top 50 List)*, DOGS OF THE DOW, <https://www.dogsofthedow.com/largest-companies-by-market-cap.htm> (last visited May 1, 2022). Of these, Facebook has the smallest market capitalization of \$720 billion. See Trefis Team & Great Speculations, *Facebook Added over \$350 Billion in Value Since 2016. Can It Repeat?*, FORBES (Aug. 5, 2020, 9:30 AM), <https://www.forbes.com/sites/greatspeculations/2020/08/05/facebook-added-over-350-billion-in-value-since-2016-can-it-repeat/>. In comparison, JP Morgan Chase, the largest U.S. bank, has a market capitalization of a "mere" \$423 billion. F. Norrestad, *Largest Banks in the United States as of February 2020, by Market Capitalization*, STATISTA (Nov. 9, 2020), <https://www.statista.com/statistics/431751/leading-banks-usa-by-market-cap/>.

4. See *N. Pac. Ry. Co. v. United States*, 356 U.S. 1, 4 (1958) (describing the Act as "a comprehensive charter of economic liberty" to rein in the excesses of trusts dominating the economy at that time); see also Harry First, *American Express, the Rule of Reason, and the Goals of Antitrust*, 98 NEB. L. REV. 319, 327 (2019) ("These five firms, dubbed the 'Frightful Five,' have raised fears about excessive power and control of peoples' lives reminiscent of the fears in the Gilded Age that sparked the Sherman Act.").

5. See, e.g., Shawn R. Johnson et al., *Antitrust in the Digital Age*, CROWELL & MORING LLP (Feb. 26, 2020), <https://www.crowell.com/NewsEvents/Publications/Articles/Antitrust-in-the-Digital-Age> ("[T]he increased attention to antitrust issues has implications far beyond the handful of companies that dominate the news."); Joint Antitrust Statement Regarding COVID-19, U.S. DEPT. OF JUST. (Mar. 2020) <https://www.justice.gov/atr/joint-antitrust-statement-regarding-COVID-19> (describing how the DOJ and the FTC stand ready to take action against individuals and businesses who use COVID-19 to prey on vulnerable Americans).

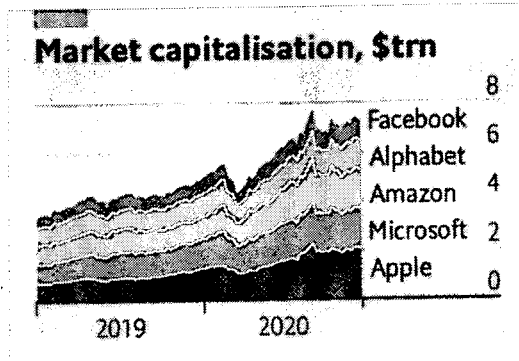


Figure 1: Big Tech Market Capitalization 2019 – 2020⁶

Today, we would never accept treating SARS-CoV-2 patients by bloodletting. Yet under the hood of the modern antitrust machine lurks a methodology that is almost medieval. Antitrust law is based on the belief that unrestrained competitive forces best allocate economic resources, offering the lowest prices and highest quality.⁷ Courts have evolved a patchwork of price theory, transaction-cost economics, game theory, and behavioral economics.⁸ Its veneer of economic sophistry belies a surprising ad hoc jurisprudence with operative terms like “anticompetitive” remaining ill-defined.⁹ Conventionally, judges look at precedent for guidance on how to decide a case before them. However, this approach may be unhelpful with variations in facts when the allegedly anticompetitive practice is new or where precedents are inconsistent with each other. With no consistent way to apply these economic instruments, courts lean instead on ideology and fit evidence and theory into outcomes dictated by their desired worldviews.¹⁰

Scholars quibble over the appropriate doctrinal architecture upon which to build antitrust’s edifice. Most are split between the

6. *America and Europe Clamp down on Big Tech*, ECONOMIST (Dec. 19, 2020), <https://www.economist.com/leaders/2020/12/19/america-and-europe-clamp-down-on-big-tech>.

7. See, e.g., Oliver E. Williamson, *The Economics of Antitrust: Transaction Cost Considerations*, 122 U. PA. L. REV. 1439, 1486 (1974).

8. See, e.g., Alan J. Meese, *Price Theory, Competition, and the Rule of Reason*, 2003 U. ILL. L. REV. 77, 77 (describing the incorporation of price-theoretic models into antitrust law and economics).

9. See, e.g., John M. Newman, *Procompetitive Justifications in Antitrust Law*, 94 IND. L.J. 501, 514 (2019) (“The scholarly arguments in favor of [the competitive-process approach] never seem to identify what, exactly, constitutes the ‘competitive process.’”).

10. See discussion *infra* Part I.A.

superiority of Harvard, Chicago, Post-Chicago, and Neo-Brandeisian approaches.¹¹ Yet, no one has provided a coherent means to mark a better boundary between healthy rivalry and illegality for all the heat generated by scholarly debates. Those seeking guidance from legislative history will find no assistance either. The Sherman Act itself lacks a discernable or enduring mandate to guide its application.¹² Instead, antitrust exists as a “special kind of common law offense,”¹³ and even textualist judges exercise extraordinary latitude when tasked with statutory interpretation. Why Congress has tolerated this state of affairs has remained a mystery to many.¹⁴

To decode antitrust, one must therefore understand its rule of reason.¹⁵ Simply put, it is a sequence of rules operationalizing policy judgments about how antitrust law should weigh economic costs, benefits, and possibilities.¹⁶ Courts require plaintiffs to show anticompetitive harm and defendants to show procompetitive benefits

11. See Christopher S. Yoo, *The Post-Chicago Antitrust Revolution: A Retrospective*, 168 U. PA. L. REV. 2145, 2146–47 (2020); see also discussion *infra* Part I. Briefly, the Harvard School assumed illegality of mergers or agreements, allowing firms to exercise market power where they had the potential to benefit consumers by lowering prices or increasing output. See Yoo, *supra* note 11, at 2151, 2161. In contrast, the Chicago School engaged in extensive factual inquiries to confirm the effects of the conduct on consumers before finding it illegal. See *id.* at 2149. The Post-Chicago School embraced game theoretic approaches to try to correct the excesses of the Chicago School. See *id.* at 2159. Neo-Brandeisians focused on broader distributional concerns. See *id.* at 2166–67.

12. See WILLIAM LETWIN, LAW AND ECONOMIC POLICY IN AMERICA: THE EVOLUTION OF THE SHERMAN ANTITRUST ACT 4 (1981) (“From the beginning many men have criticized the [Sherman] Act as vague, its meaning as elusive, its commands as ambiguous.”); Roger D. Blair & John E. Lopatka, *Albrecht Overruled—At Last*, 66 ANTITRUST L.J. 537, 552 (1998) (stating commentators critique the Sherman Act for its “indefinite language” and “elusive meaning”); Michael S. Jacobs, *An Essay on the Normative Foundations of Antitrust Economics*, 74 N.C. L. REV. 219, 232 (1995) (describing prevailing views that the Sherman Act’s legislative history is “confused”).

13. HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE 53 (3d ed. 2005).

14. Perhaps Congress did not want to be responsible for controversial political choices, or it could not legislate to encompass the diverse market conditions antitrust governs meaningfully. See William H. Page, *Interest Groups, Antitrust, and State Regulation: Parker v. Brown in the Economic Theory of Legislation*, 1987 DUKE L.J. 618, 659 (1987) (“[T]he Sherman Act is so open textured and the legislative history so vague, that any standard the Court adopts is ultimately a judicial creation.”); see also Daniel A. Farber & Brett H. McDonnell, *Is There a Text in This Class? The Conflict between Textualism and Antitrust*, 14 J. Contemp. Legal Issues 619 (2005).

15. See *Cont’l T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36, 49 (1977) (explaining that the rule of reason is the “prevailing standard of analysis”).

16. See *id.*

to counterbalance the harm.¹⁷ To say a restraint on competition is legal is to say it is, on balance, benign.

That judicial ledger, bound by loosely worded precedent accumulated over 130 years, does antitrust law's heavy lifting. Its annals are replete with memorable cases—from *Standard Oil*, where the Supreme Court devised the rule of reason,¹⁸ to *Leegin*, where it overtly renounced per se prohibitions against minimum resale price maintenance agreements, thus breaking another frontier open to applying the rule of reason,¹⁹ to *Amex*, where a deeply divided Court could not agree if it recognizes typical signs of antitrust harm when analyzing a two-sided market, with the majority sidestepping the rule of reason altogether.²⁰

Listing leading cases is easy. Applying the rule of reason is where the problem lies.²¹ Chief Justice Roberts complained about the “amorphous rule of reason.”²² Justice Breyer observed that implementing procompetitive benefits in the rule of reason analysis is an “absolute mystery.”²³ Professor Lina Khan concluded that the rule of reason is “unwieldy, indeterminate, and unadministrable.”²⁴ This approach is fiddly and provides no way to navigate some of the most consequential economic decisions in our time.²⁵

17. See *id.* at 59.

18. See *Standard Oil Co. v. United States*, 221 U.S. 1, 66 (1911).

19. See *Leegin Creative Leather Prods., Inc. v. PSKS, Inc.*, 551 U.S. 877, 887 (2007).

20. See *Ohio v. Am. Express Co.*, 138 S. Ct. 2274, 2287 (2018).

21. See, e.g., *Leegin*, 551 U.S. at 916 (Breyer, J., dissenting) (“How easily can courts identify instances in which the benefits are likely to outweigh potential harms? My own answer is, *not very easily.*”).

22. *Fed. Trade Comm'n v. Actavis, Inc.*, 570 U.S. 136, 160, 173 (2013) (Roberts, C.J., dissenting) (“[T]he majority declares that such questions should henceforth be scrutinized by antitrust law's unruly rule of reason. Good luck to the district courts that must, when faced with a patent settlement, weigh the likely anticompetitive effects, redeeming virtues, market power, and potentially offsetting legal considerations present in the circumstances.”).

23. See Transcript of Oral Argument at 24, *Ohio v. Am. Express Co.*, 138 S. Ct. 2274 (2018) (No. 16-1454); see also LAWRENCE A. SULLIVAN ET AL., *THE LAW OF ANTITRUST: AN INTEGRATED HANDBOOK* § 5.3f (3rd ed. 2016) (“[W]hat constitutes an offsetting benefit to competition” remains a “question left open.”).

24. Lina M. Khan, *The End of Antitrust History Revisited*, 133 HARV. L. REV. 1655, 1676 (2020). But see Andrew I. Gavil, *Moving Beyond Caricature and Characterization: The Modern Rule of Reason in Practice*, 85 S. CAL. L. REV. 733, 735 (2012) (describing antitrust as “a collection of ‘rules of reason’ that cut across [statutes] and serve as a set of unifying first principles of antitrust law”).

25. See JASON FURMAN ET AL., H.M. TREASURY (U.K.), *UNLOCKING DIGITAL COMPETITION: REPORT OF THE DIGITAL COMPETITION EXPERT PANEL 2* (2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785547/unlocking_digital_competition_furman_review_web.pdf (suggesting that, in the context of the digital economy, a more forward-looking

Ill-defined rules are vulnerable to capricious interpretation and weaken the rule of law.²⁶ If compliance remains a shot in the dark, the law itself may deter legitimate conduct or cause judges to refuse to enforce it when they should.²⁷ Businesses left to flounder in an uncertain regulatory environment will systematically fail to abide by the law.²⁸ It is no answer for them that they must wait for a judge to tell them whether a contractual restraint or merger is legal in the face of treble damages.²⁹ Byzantine and idiosyncratic rules make litigation highly costly and protracted when disputes arise, requiring extensive discovery and costly expert analysis.³⁰ Unfortunately, as judges struggle with the rule of reason, they end up compounding their confusion to the jurisprudence instead.³¹ And when the law struggles to offer clear answers, it creates other problems.

The arc of antitrust history shows that uncertainty tends to skew towards corporate opportunism.³² Businesses have much to gain, and the likelihood of being successfully sued for treble damages is low when rules are uncertain.³³ Judicial permissiveness exacerbates this state of affairs.³⁴ Judges, overwhelmed by complex rules and markets

approach with clearer *ex ante* rules is needed).

26. See Anthony D'Amato, *Legal Uncertainty*, 71 CALIF. L. REV. 1, 6 (1983) ("What is really undesirable about uncertain rules of law is that they leave persons unsure of their entitlements while affording unfettered discretion to official decisionmakers.").

27. See Rohit Chopra & Lina M. Khan, *The Case for "Unfair Methods of Competition" Rulemaking*, 87 U. CHI. L. REV. 357, 359 (2020) ("[T]he reliance on case-by-case adjudication yields a system of enforcement that generates ambiguity, unduly drains resources from enforcers, [privileges incumbents,] and deprives individuals and firms of any real opportunity to democratically participate in the process" of creating substantive antitrust rules.).

28. See Thomas A. Piraino, Jr., *A New Approach to the Antitrust Analysis of Mergers*, 83 B.U. L. REV. 785, 807 (2003) (stating that the rule of reason has "become so confusing that it preclude[s] antitrust practitioners from advising their clients as to the legality of particular conduct").

29. See 15 U.S.C. § 15 (2018) (providing for "threefold the damages by him sustained, and the cost of suit, including a reasonable attorney's fee").

30. See WILLIAM KOLASKY ET AL., ABA SECTION OF ANTITRUST LAW, CONTROLLING COSTS OF ANTITRUST ENFORCEMENT AND LITIGATION 1 (2012) (stating that the report was made as "a response to concerns" about both "the costs imposed on businesses by the American system of antitrust enforcement" and "the length of time required to resolve antitrust issues both in litigation and in enforcement proceedings"); Chopra & Khan, *supra* note 28 ("One reason that antitrust adjudication suffers from these shortcomings is that courts analyze most forms of conduct under the 'rule of reason' standard [which] involves a broad and open-ended inquiry into the overall competitive effects of particular conduct . . .").

31. See discussion *infra* Part I.A.

32. See discussion *infra* Part I.B.

33. See Chopra & Khan, *supra* note 27, at 371.

34. See *id.* at 359.

and wary of private litigation, embraced Chicago's statements of faith in the market's ability to renew itself, in turn, systematically diminishing antitrust plaintiffs' ability to prevail.³⁵

Under Chicago's rule, plaintiffs lose an over-whelming majority of cases in the face of heightened procedural, evidential, and substantive barriers,³⁶ even while judges relax scrutiny of vertical agreements, dominant firm behavior, and mergers to benefit defendants.³⁷ Judge Posner summed it up by observing the rule of reason was simply a "euphemism for nonliability."³⁸ Empowering judges to focus on adjudication will be crucial for courts to administer justice more efficiently and effectively in antitrust cases.

For the first time in antitrust law's turbulent history, things could get much easier. "In the same way that Amazon disrupted e-commerce through its inventory and sales algorithms and TikTok's progressive recommendation system keeps users hooked, [artificial intelligence (AI) can] revolutionize antitrust law."³⁹ Lawyers today use AI to analyze contracts, prosecute trademarks, and predict criminal recidivism,⁴⁰ and scholars envision "automated regulation" as an

35. See discussion *infra* Part I.B; see also William E. Kovacic, *The Chicago Obsession in the Interpretation of U.S. Antitrust History*, 87 U. CHI. L. REV. 459, 459 (2020) ("Discussions about the evolution of the US antitrust system since the early 1970s often dwell upon the influence of the Chicago School in shaping substantive rules and enforcement policy.").

36. See Michael A. Carrier, *The Rule of Reason: An Empirical Update for the 21st Century*, 16 GEO. MASON L. REV. 827, 828–30 (2009) (reporting that between 1999 and 2009, defendants won more than 99% of the time); Khan, *supra* note 24.

37. See, e.g., *Leegin Creative Leather Prods., Inc. v. PSKS, Inc.*, 551 U.S. 877, 907–08 (2007); *Verizon Comm'ns, Inc. v. Law Offices of Curtis V. Trinko, LLP*, 540 U.S. 398, 415–16 (2004); *Monsanto Co. v. Spray-Rite Serv. Corp.*, 465 U.S. 752, 768 (1984); *Conf'l T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36, 58 (1977); *Brunswick Corp. v. Pueblo Bowl-O-Mat, Inc.*, 429 U.S. 477, 489 (1977).

38. Richard A. Posner, *The Rule of Reason and the Economic Approach: Reflections on the Sylvania Decision*, 45 U. CHI. L. REV. 1, 14 (1977); see also Douglas H. Ginsburg, *Vertical Restraints: De Facto Legality Under the Rule of Reason*, 60 ANTITRUST L.J. 67, 71 (1991) (describing a study where defendants were successful on the rule of reason in more than 90% of cases); Khan, *supra* note 24 ("[T]he current system provides stability . . . through shielding defendants from liability.").

39. Daryl Lim, *Can Computational Antitrust Succeed?*, 1 STAN. COMPUTATIONAL ANTITRUST 38, 38 (2021); see Riccardo Guidotti, *Artificial Intelligence and Explainability, in ARTIFICIAL INTELLIGENCE IN THE AUDIOVISUAL SECTOR* 3, 3 (Francisco Javier Cabrera Blázquez & Sophie Valais eds., France Courrèges et al. trans., 2020) (defining AI as "the 'intelligence' shown by machines or by any technology or software in performing an activity"); Daksh Trehan, *The Inescapable AI Algorithm: TikTok*, TOWARDS DATA SCI. (June 12, 2020), <https://towardsdatascience.com/the-inescapable-ai-algorithm-tiktok-ad4c6fd981b8/>; see also Daryl Lim, *AI & IP: Innovation & Creativity in an Age of Accelerated Change*, 52 AKRON L. REV. 813, 842 (2018) (discussing the rise of AI and its implications for IP law).

40. See Josh Kern, *AI in Law: Transforming Legal Practice*, CLIO (Nov. 2, 2021),

imminent reality.⁴¹ AI “can help courts curate and refine precedential antitrust cases, identify anticompetitive effects, . . . model innovation effects [in intellectual property rights cases, as well as] counterfactuals in killer acquisition cases.”⁴² “Big data, deep learning, and data mining can help [courts] identify relevant market variables even in the absence of an established theory and, more broadly, detect connections without . . . legal significance that parties do not know or have no capacity to examine.”⁴³ Data-rich analyses can dampen ideological swings, correct systemic plaintiff bias, abbreviate notoriously long and expensive discovery, and finally bring long-sought consistency to antitrust adjudication.⁴⁴

Part I makes a case for an AI revolution. It traces the rule of reason’s indeterminacy to its roots in consumer welfare, precedent, ideology, and counterfactuals. It explains why Congress will not provide a fix and how the failure of Chicago’s laissez-faire approach on its terms birthed an ill-advised alternative in the form of Neo-Brandeisianism. Part II bridges two dominant streams of scholarship by shifting the focus from AI as a collusive threat to its potential as a forensic and predictive tool to operationalize and refine antitrust jurisprudence. This new method of algorithmic adjudication presents a new normative paradigm to replace Chicagoan fears of judicial inaptitude and false positives with a truly evidence-based alternative, particularly when dealing with cases involving nascent acquisitions and intellectual property rights.

Part III gets down to the brass tacks, confronting well-known concerns with AI deployment—bias, accountability, and data availability. The departure of Google AI ethics researcher Timnit

<https://www.clio.com/blog/lawyer-ai/>.

41. Felix Mormann, *Beyond Algorithms: Toward a Normative Theory of Automated Regulation*, 62 B.C. L. REV. 1, 2–3 (2021) (reporting that “[b]etween 2017 and 2019, twenty-two of the top twenty-five law reviews in the United States published one or more pieces on [AI]”).

42. Lim, *supra* note 40. See generally JAMES LARUS ET AL., INFORMATICS EUROPE, ACM EUROPE COUNCIL & ACM EUROPE POL’Y COMM., WHEN COMPUTERS DECIDE: EUROPEAN RECOMMENDATIONS ON MACHINE-LEARNED AUTOMATED DECISION MAKING 9 (2018), <https://www.acm.org/binaries/content/assets/public-policy/ie-euacm-adm-report-2018.pdf> (discussing how AI can assist “judges in making sentencing and incarceration decisions in criminal actions”).

43. Lim, *supra* note 39, at 41; see, e.g., Theodore W. Ruger et al., *The Supreme Court Forecasting Project: Legal and Political Science Approaches to Predicting Supreme Court Decisionmaking*, 104 COLUM. L. REV. 1150, 1150 (2004) (predicting 75% of the Supreme Court’s affirm/reverse results correctly, compared to 59.1% when done by legal experts).

44. See, e.g., Colin S. Diver, *The Optimal Precision of Administrative Rules*, 93 YALE L.J. 65 (1983) (discussing the imprecision in administrative rules and policymaking).

Gebru, allegedly triggered by her concerns over biases in Google's data models, underscores the challenges of translating AI governance to practice.⁴⁵ Part III demonstrates how these concerns, while legitimate, can be significantly mitigated, or in some cases, comprehensively addressed. This Article concludes by reflecting on the broader implications of algorithmic adjudication beyond antitrust law by discussing atextualism in action, algocracy and the common law, and the implications of plaintiff success to the rule of law.

I. THE CASE FOR REVOLUTION

The roots of revolution lie in discontent with the status quo.⁴⁶ In the case of antitrust, that discontent springs from its indeterminacy. While that indeterminacy precedes the Chicago School, its influence made it more difficult for courts to apply the rule of reason, and consequently, made it less likely plaintiffs would prevail. This Part explains how and why an antitrust revolution was all but assured.

A. Antitrust's Black Box

At the heart of every antitrust case is the rule of reason, a rule rooted in probability, not certainty.⁴⁷ Professor John Newman blames courts for offering "far too little guidance" and warns that their opinions "carr[y] substantial risk of producing both false negatives and false positives."⁴⁸ Professor Gabriel Feldman memorably described the situation courts face:

Since its creation in 1918, the rule of reason articulated in *Chicago Board of Trade* has been under constant attack. Referred to as the "antitrust equivalent to . . . water torture," the rule, which is the

45. See Lim Sun Sun & Jeffrey Chan Kok Hui, *Moving AI Ethics Beyond Guidelines*, STRAITS TIMES (Dec. 16, 2020, 5:00 AM), <https://www.straitstimes.com/opinion/moving-ai-ethics-beyond-guidelines-0> (stating that Dr. Gebru co-led Google's Ethical AI team and won acclaim for her research on the deficiency of AI in recognizing the faces of women and people of color, risking discriminatory AI systems).

46. See, e.g., FRANCO VENTURI, *ROOTS OF REVOLUTION: A HISTORY OF THE POPULIST AND SOCIALIST MOVEMENTS IN NINETEENTH CENTURY RUSSIA* vii–viii (2001).

47. See *Bd. of Trade v. United States*, 246 U.S. 231, 238 (1918). In Justice Brandeis's "classic" statement of the rule of reason, he explained that the court "must ordinarily consider . . . the nature of the restraint and its effect, actual or probable." *Id.*; see also *Am. Needle, Inc. v. Nat'l Football League*, 560 U.S. 183, 203 n.10 (2010) ("Justice Brandeis provided the classic formulation of the Rule of Reason in *Board of Trade of Chicago v. United States* . . .").

48. Newman, *supra* note 9, at 531.

primary method for determining the legality of restraints . . . is criticized for, inter alia, representing nothing more than a muddled set of platitudes with no meaningful standards [C]ritics argue that its execution is cripplingly obtuse and is akin to the proverbial “search for a needle in a haystack.”⁴⁹

Four key factors contribute to and compound the rule of reason’s opacity: 1) the consumer welfare standard, 2) precedent, 3) ideology, and 4) counterfactuals. I discuss each in turn.

1. Indeterminacy of Consumer Welfare

Chicagoan antitrust favors a conservative approach to enforcement guided by the consumer welfare standard.⁵⁰ Lionized by Yale professor and former Solicitor General Robert Bork in his book *The Antitrust Paradox*, Bork saw consumer welfare as synonymous with economic efficiency.⁵¹ Demand may drive up prices, but those prices simply reflect consumer preference for a superior product; Chicagoan antitrust folded this belief into its jurisprudence.⁵² Professor Tim Wu observed that consumer welfare was popular because it was a simple enough economic concept that judges, “anxious when asked to decide complex and challenging cases,” could lean on it “as a tool of judicial restraint.”⁵³

In theory, the consumer welfare standard provides stakeholders with a way to determine if a business practice violates antitrust law and functions as a rail guard to keep antitrust on track to benefit

49. Gabriel A. Feldman, *The Misuse of the Less Restrictive Alternative Inquiry in Rule of Reason Analysis*, 58 AM. U. L. REV. 561, 562 (2009) (quoting *In re Detroit Auto Dealers Ass’n*, 955 F.2d 457, 475–76 (6th Cir. 1992)); *Id.* (quoting Panel Discussion, *Market Power and Entry Barriers*, 57 ANTITRUST L.J. 701, 714 (1989)).

50. See *Reiter v. Sonotone Corp.*, 442 U.S. 330, 343 (1979) (quoting ROBERT BORK, *THE ANTITRUST PARADOX* 66 (1978)) (“Congress designed the Sherman Act as a ‘consumer welfare prescription.’”).

51. See generally BORK, *supra* note 50, at 295–97 (describing the effects of increasing output and avoiding the deadweight welfare loss that comes from a misallocation of resources); see also Kovacic, *supra* note 35 (“Many commentators attribute to Chicago School scholars—most notably, Judge Robert Bork—the decisive role in gaining broad acceptance for permissive standards governing mergers, vertical restraints, and dominant firm behavior.”).

52. See TIM WU, *THE CURSE OF BIGNESS: ANTITRUST IN THE NEW GILDED AGE* 91 (2018) (observing that this legitimized consumer welfare allows it to capture antitrust doctrine).

53. *Id.*; see also Thomas B. Nachbar, *Heroes and Villains of Antitrust*, in 18 ANTITRUST SOURCE 1, 4 (2019) (“Bork did not invent the consumer welfare standard (that was Director), but he did ‘weaponize’ it against antitrust.”).

consumers as its principal beneficiaries. However, in practice, Bork's consumer welfare standard forces courts to determine an optimal allocation of resources ad hoc. This task may be hard to do and even harder to follow in subsequent cases.⁵⁴ Instead of using the "information provided by new cases to tinker[] with old rules," they must now efficiently allocate resources by weighing "the effects of the challenged conduct on consumer welfare" and "decide whether denial of an input or its provision is optimal on a case-by-case basis."⁵⁵

Professor Herbert Hovenkamp sounded a warning that "Bork's conclusion that productive efficiencies are simply incapable of measurement is ludicrous and inconsistent with rational firm behavior."⁵⁶ He added that should antitrust's economic goals fail to steer clear from this "I know it when I see it" approach, it risks "return[ing] us to a day when antitrust used very expansive rhetoric but was able to accomplish almost nothing."⁵⁷ The costs required of businesses to develop economic evidence of such production efficiencies are enormous and skews against plaintiffs. In those instances, the temptation for judges is to take efficiencies on faith. Over the last several decades, courts have indeed taken on this article of faith in blessing widening price-cost margins and regarding them as nothing more than free-market efficiencies at work.⁵⁸

The overlay of technology complicates consumer welfare analysis. Markets steeped in technology may require courts to balance short-term losses against future predicted gains, an exercise that scholars

54. See *Leegin Creative Leather Prods., Inc. v. PSKS, Inc.*, 551 U.S. 877, 917 (2007) (Breyer, J., dissenting) ("One cannot fairly expect judges and juries in such cases to apply complex economic criteria without making a considerable number of mistakes, which themselves may impose serious costs."); First, *supra* note 4, at 325 ("Bork's notion of 'consumer welfare,' and the bases of his economic arguments, have been constantly critiqued since the publication of *The Antitrust Paradox*.").

55. Ramsi A. Woodcock, *The Market as a Learning Algorithm: Consequences for Regulation and Antitrust* 56-57 (2020) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3661971; see also Barak Y. Orbach, *The Antitrust Consumer Welfare Paradox*, 7 J. COMPETITION L. & ECON. 133, 134 (2010) ("This article chronicles how academic confusion and thoughtless judicial borrowing led to the rise of a label that 30 years later has no clear meaning.").

56. Herbert Hovenkamp, *Antitrust's Borderline* 19 (Univ. of Pa. Inst. for L. & Econ., Research Paper No. 20-44, 2020); see also Khan, *supra* note 24, at 1675 ("[C]onsumer welfare suffers from conceptual deficiencies and raises serious practical difficulties, arguments that consumer welfare proponents have yet to seriously engage or rebut.").

57. Hovenkamp, *supra* note 56, at 21.

58. See Herbert J. Hovenkamp, *Antitrust: What Counts as Consumer Welfare?* (Univ. Pa. L. Leg. Scholarship Repository, Faculty Scholarship No. 2194, 2020) (https://scholarship.law.upenn.edu/faculty_scholarship/2194) ("Under Bork's tutelage we have seen a dramatic rise in margins, and thus in the presence of monopoly power, over the past forty years.").

have called “speculative, possibly labyrinthine,”⁵⁹ casting doubt on sound judicial judgments in cases of immense legal and economic significance.⁶⁰ The poorly understood legal terrain makes the work of providing meaningful antitrust counseling difficult.⁶¹ This lack of fair notice raises constitutional due process concerns. As the Supreme Court explained, fair notice concerns arise when a law or regulation “fails to provide a person of ordinary intelligence fair notice of what is prohibited, or is so standardless that it authorizes or encourages seriously discriminatory enforcement.”⁶²

Intellectual property rights may trigger bias when judges need to weigh consumer welfare effects. For instance, judges may deem intellectual property rights owners as low risk in antitrust cases more often than non-intellectual property rights owners only because balancing dynamic and static efficiencies were too complicated for generalist judges, resulting in treating their conduct as per se legal rather than because the judges properly conducted a rule of reason analysis and reached that conclusion. The Supreme Court has long taken the position that if an intellectual property owner licenses a product market competitor, the owner may restrict the price at which its competitor sells the licensed product.⁶³ Intellectual property has been the basis of the rise of Big Tech firms and precisely why these firms have been able to grow essentially free from antitrust scrutiny.⁶⁴

In general, the risk in this bias is that courts may dismiss increases in price-cost margins simply as nothing more than efficiencies in play. Indeed, Chief Justice Roberts, writing for the dissent in *Actavis*—a case involving pharmaceutical patents—used consumer welfare precisely as the basis for approving reverse payment settlements that resulted in substantially higher prices to consumers.⁶⁵ Similarly, the majority in *American Express*—a case

59. Richard D. Cudahy & Alan Devlin, *Anticompetitive Effect*, 95 MINN. L. REV. 59, 87 (2010).

60. See Fed. Comm’n Comm’n v. Fox Television Stations, Inc., 567 U.S. 239, 253 (2012) (discussing the importance of laws that give fair notice of forbidden or required conduct).

61. See Johnson et al., *supra* note 5 (“Antitrust enforcers are struggling to figure out how to define and police the amount of market power these platforms have amassed Within antitrust circles, a debate has emerged about whether current law and legal precedent suffice to address the alleged challenges presented by Big Tech platforms.”).

62. *United States v. Williams*, 553 U.S. 285, 304 (2008).

63. See *United States v. Gen. Elec. Co.*, 272 U.S. 476, 493–94 (1926).

64. See Kirti Gupta, *Intellectual Property Versus Big Tech Platforms: The IP-Antitrust Paradox*, CTR. FOR STRATEGIC & INT’L STUD. (Sept. 28, 2021), <https://www.csis.org/analysis/intellectual-property-versus-big-tech-platforms-ip-antitrust-paradox>.

65. See Fed. Trade Comm’n v. *Actavis, Inc.*, 570 U.S. 136, 161, 163 (2013)

dealing with Amex's anti-steering rules—paid lip service to consumer welfare while endorsing higher consumer prices.⁶⁶

In sum, the consumer welfare standard forces judges to take efficiencies on faith, and they have tended to do so in intellectual property and technology cases. The consumer welfare standard also forces courts to determine an optimal allocation of resources ad hoc. This task may be hard to do, creating case precedents with little value in guiding later cases. Finally, while it feeds the indeterminacy of case precedent, it is far from the only culprit.

2. Indeterminacy of Precedent

The institutional dynamics of antitrust showcase an unparalleled display of Congressional lawmaking delegation, resulting in a judicial culture for courts to assume greater latitude when interpreting precedent.⁶⁷ According to Professors Harlan Blake and William Jones, Congress enacted the Sherman Act primarily motivated by a concern for “the abusive behavior of economic giants” and “sympathy for their victims, consumers and businessmen deprived of alternatives and opportunities[.]”⁶⁸ This included freedom of choice for consumers and businesses, fair wealth distribution, and protecting small businesses against exclusionary practices.⁶⁹ As Professor Daniel Crane put it, “Congress legislates on the popular aspiration for an egalitarian economy organized around small proprietors and independent local businesses and freedom from economic dominance.”⁷⁰

Post-enactment, however, Congress seemed content to leave it to courts to read the statutes to balance efficiency and industrial progress pragmatically.⁷¹ This arrangement meant that courts could embellish the Sherman Act's text and trim it down in favor of owners of capital.⁷² Indeed, cases show that courts rejected the economic

(Roberts, C.J., dissenting).

66. See *Ohio v. Am. Express Co.*, 138 S. Ct. 2274, 2294 (2018) (Breyer, J., dissenting); see also Hovenkamp, *supra* note 56, at 21 (“In both cases the practice was highly profitable to producers, and that was all that mattered.”).

67. See Daniel A. Crane, *Antitrust Antitextualism*, 96 NOTRE DAME L. REV. 1205, 1255 (2021) (“Old habits die hard, and the habit of antitrust antitextualism grows from the very roots of antitrust history.”). Another way to see this is as a nondelegation problem.

68. Harlan M. Blake & William K. Jones, *In Defense of Antitrust*, 65 COLUM. L. REV. 377, 384 (1965).

69. See *id.* at 381.

70. Crane, *supra* note 67, at 1247.

71. See Farber & McDonnell, *supra* note 14, at 657 (identifying an intellectually diverse set of scholars who “view the antitrust laws, not as statutory mandates, but as delegations of lawmaking power to the courts”).

72. Cf. Crane, *supra* note 67, at 1210 (quoting William N. Eskridge, Jr. & John

atomism that catalyzed the Act's enactment in the first place, speaking of the Act as representing a "competitive ideal,"⁷³ "a comprehensive charter of economic liberty,"⁷⁴ or "the Magna Carta of free enterprise."⁷⁵ By framing the Sherman Act loftily, judges paid homage to the nation's economic ideals, taking them seriously but not literally.

Consider the Supreme Court's declaration that "the language of § 1 of the Sherman Act . . . cannot mean what it says," reasoning that Congress must not have intended "the text of the Sherman Act to delineate the full meaning of the statute or its application in concrete situations," thus justifying the courts in shaping "the statute's broad mandate by drawing on common-law tradition."⁷⁶ In doing so, the Court invented a safe harbor for "reasonable" restraints of trade.⁷⁷ At first blush, "reasonable" is no less an amorphous term than "the public interest" that informs courts whether they should grant injunctive relief.⁷⁸ However, the centrality of the rule of reason to all antitrust determinations gives courts wide discretion in interpreting the law and the evidence before them, causing precedent to offer little guidance.

The Supreme Court's rulings can be Delphic, leaving it to lower courts to fill in the details which "delay[s] clarity and certainty for years or even decades."⁷⁹ Lower courts, in turn, already burdened with

Ferejohn, *Super-Statutes*, 50 DUKE L.J. 1215, 1216 (2001) (describing how the rules "are often suspended or modified when such statutes are interpreted").

73. *Jefferson Par. Hosp. Dist. No. 2 v. Hyde*, 466 U.S. 2, 14 (1984).

74. *N. Pac. Ry. Co. v. United States*, 356 U.S. 1, 4 (1958).

75. *United States v. Topco Assocs.*, 405 U.S. 596, 610 (1972).

76. *Nat'l Soc'y of Prof'l Eng'rs v. United States*, 435 U.S. 679, 687–88 (1978). The Court similarly held that relevant rule of reason considerations include

[T]he facts peculiar to the business to which the restraint is applied; its condition before and after the restraint was imposed; the nature of the restraint and its effect, actual or probable[;] [t]he history of the restraint[;] the evil believed to exist[;] the reason for adopting the particular remedy[;] and] the purpose or end sought to be attained

Bd. of Trade v. United States, 246 U.S. 231, 238 (1918).

77. *See Standard Oil Co. v. United States*, 221 U.S. 1, 59–60 (1911). *But see id.* at 89–90, 94 (Harlan, J., dissenting) (declining to accept an interpretation of the Sherman Act where Congress intended only to strike down contracts that were *unreasonable* restraints of trade).

78. *See, e.g., eBay, Inc. v. MercExchange, LLC*, 547 U.S. 388, 391 (2006) (stating that one of the elements of injunctive relief is showing "that the public interest would not be disserved by a permanent injunction").

79. *Chopra & Khan, supra* note 27, at 360; *see, e.g., Fed. Trade Comm'n v. Actavis, Inc.*, 570 U.S. 136, 160 (2013) ("We therefore leave to the lower courts the

weighing “the effects of the challenged conduct on consumer welfare [and] decid[ing] whether denial of an input or its provision is optimal on a case-by-case basis,” may well be tempted to simply focus on the justice of the case while paying lip service to *stare decisis*.⁸⁰ Conflicting precedents may result from the ideological shifts over time, bad judgment calls, or judges covertly refusing to follow precedent, which cannot be analogically distinguished. Conflicting precedents create an obstacle in successfully using case precedents as training data for AI, given that a key part of the data is these precedents.⁸¹ Adding to that, “plaintiffs [sue] in dozens of different courts [presided over by] hundreds of different generalist judges and juries.”⁸² All this makes piecing together idiosyncratic facts, that will not add up to give any coherent guidance, difficult, unlike a properly pieced jigsaw puzzle.⁸³

Those seeking to understand and apply antitrust law effectively may be tempted to turn instead to grasp the nuances of terms in the cases themselves. However, the problem, as Bork noted, was “[t]he fact that judges, like the rest of us, have used the word to mean very different things has resulted in the fruitless discourse of men talking past each other.”⁸⁴ It is policy, rather than textualism or originalism, that primarily guides each case’s result. In turn, that policy is driven by undercurrents of raw ideology and unconscious biases that align loosely worded statutes, choice phrases in legal precedent, and economic jargon to reach outcomes.⁸⁵

3. Indeterminacy of Ideology

Despite scholars passionately arguing that antitrust is largely technocratic and apolitical,⁸⁶ the emerging consensus indicates the opposite.⁸⁷ Courts that operationalize probabilistic language, like

structuring of the present rule-of-reason antitrust litigation.”).

80. See Woodcock, *supra* note 55.

81. See discussion *infra* Part II.A.

82. Chopra & Khan, *supra* note 27, at 360.

83. See *id.*

84. BORK, *supra* note 50, at 58.

85. See Marina Lao, *Ideology Matters in the Antitrust Debate*, 79 ANTITRUST L.J. 649, 650 (2014) (observing that “the Supreme Court and other federal courts, beginning with *Continental T.V., Inc. v. GTE Sylvania Inc.*, have tended to adopt the language of economics and to ground their decisions in economic reasoning”).

86. See, e.g., Daniel A. Crane, *Has the Obama Justice Department Reinvented Antitrust Enforcement?*, 65 STAN. L. REV. ONLINE 13, 13–14 (2012) (“Antitrust enforcement in the modern era is a technical and technocratic enterprise.”); Richard A. Posner, *The Chicago School of Antitrust Analysis*, 127 U. PA. L. REV. 925, 948 (1979) (“Differences remain, but increasingly they are technical rather than ideological.”).

87. See, e.g., Jonathan B. Baker, *Economics and Politics: Perspectives on the*

“plausible,” “potential,” and “likely,” are vulnerable to relying on idiosyncratic biases, making the outcomes vulnerable to ideological stampeding as the judges, forced to balance short-term losses against future predicted gains, may instead fall back on answering more straightforward proxy questions.⁸⁸ In response, Professor Joshua Wright advocated for “evidence-based antitrust” as the solution to ideological bias.⁸⁹ Professor Marina Lao, however, cautions in response that, “[h]ow one interprets the evidence, and how much and which types of evidence one deems sufficient, will almost certainly be influenced by one’s individual values.”⁹⁰

A court’s ideology persistently—and sometimes insidiously—influences its theoretical lens, its impetus to intervene, the admissibility and weight of the evidence parties present, as well as the relative costs of false negatives to false positives.⁹¹ For instance, steered by Chicago School ideology, judges starting in the 1960s became convinced that mistaken intervention error costs were real and feared.⁹² Because antitrust law applies to all industries, a practice outlawed for one firm or industry would be outlawed for all firms in all industries—not to mention the treble damages that the liable antitrust defendant would have to pay.⁹³ By 1979, the Supreme Court was convinced antitrust should only intervene in conduct “known to be always or almost always harmful to consumers.”⁹⁴

Chicagoans believe anticompetitive exclusion is ineffective and enjoy several ready justifications, including prevention of free-riding, minimization of transaction costs, and permission of straightforward profit maximization.⁹⁵ False positives are more costly than false

Goals and Future of Antitrust, 81 *FORDHAM L. REV.* 2175, 2176 (2013) (discussing the roles of politics and economics in U.S. antitrust).

88. See, e.g., Daryl Lim, *Retooling the Patent-Antitrust Intersection: Insights from Behavioral Economics*, 69 *BAYLOR L. REV.* 124, 134 (2017) (discussing how complex questions can lead judges to search for “an easier and related question”).

89. Joshua D. Wright, *Abandoning Antitrust’s Chicago Obsession: The Case for Evidence-Based Antitrust*, 78 *ANTITRUST L.J.* 241, 242–43 (2012).

90. Lao, *supra* note 85, at 655.

91. See *id.* at 653.

92. See Woodcock, *supra* note 55, at 4 (“Disaster could result, argued the Chicago School, because much innovative conduct looks superficially anticompetitive.”).

93. See 15 U.S.C. §§ 4, 15 (2018).

94. Woodcock, *supra* note 55, at 4 (“That rule was a capitulation to the argument of Chicago School thinkers like Robert Bork that antitrust rules that incidentally condemn some good conduct could be disastrous for consumers and the economy more generally.”); see *Broad. Music, Inc. v. Columbia Broad. Sys., Inc.*, 441 U.S. 1, 7–10 (1979).

95. See Richard A. Posner, *Exclusionary Practices and the Antitrust Laws*, 41 *U. CHI. L. REV.* 506, 506, 508 (1974) (“One of the achievements of the Chicago School has been to show that some practices thought to be exclusionary practices, notably tying, really should be considered as monopoly profit maximization other than by collusion

negatives in that false positives deter procompetitive conduct and efficiencies from falsely condemned restraints will result in long-lasting adverse effects.⁹⁶ In contrast, the adverse effects of false negatives dissipate as the market self-corrects.⁹⁷ The economics yield a system where, as Wright observed, “[c]ourts and enforcement agencies retain broad discretion in selecting theoretical models ad hoc, tailoring decisions to the arbiter’s relative economic sophistication, intellectual priors, or even desired result,”⁹⁸ which ironically echoes similar criticisms of ad hoc enforcement that Chicago School scholars criticized in the pre-Chicago era.⁹⁹

Unfortunately, Chicagoan antitrust has not developed a reliable way to weigh false positive and false negative risks or estimate their relative costs.¹⁰⁰ Wright himself acknowledges empirical evidence is “scarce” and “does not conclusively show that exclusive dealing is always or only pro-competitive.”¹⁰¹ The likelihood of harm, he notes, is “a set of possibility theorems.”¹⁰² Similarly, Lao warned that economic propositions might be unprovable because they require incommensurable values or because the necessary data is unavailable or deficient.¹⁰³ Economic analysis is particularly likely to be indeterminate when the restraint has anticompetitive and procompetitive justifications.¹⁰⁴ In such instances, their effects may be unquantifiable.¹⁰⁵ Yet this has not stopped judges, who are worried about chilling procompetitive conduct and the high costs of litigation on the one hand, while dismissive of the costs of failing to deter harmful conduct on the other, from still relying on unsupported claims about competitive effects.¹⁰⁶

or exclusion . . .”).

96. See *Verizon Commc’ns, Inc. v. L. Offs. of Curtis V. Trinko, LLP*, 540 U.S. 398, 414 (2004) (quoting *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 594 (1986)) (“[False positives] are especially costly, because they chill the very conduct the antitrust laws are designed to protect.”).

97. See Frank H. Easterbrook, *The Limits of Antitrust*, 63 TEX. L. REV. 1, 2–3 (1984).

98. Wright, *supra* note 89, at 241.

99. See Robert H. Bork & Ward S. Bowman, Jr., *The Crisis in Antitrust*, 65 COLUM. L. REV. 363, 364 (1965) (decrying the “schizophrenia afflicting basic antitrust policy”).

100. Lao, *supra* note 85, at 663.

101. Joshua D. Wright, *An Evidence-Based Approach to Exclusive Dealing and Loyalty Discounts* 4 (George Mason Univ. Law & Econ. Rsch. Paper Series, Paper No. 09-32, 2009), http://ssrn.com/abstract_id=1434406.

102. *Id.* at 3.

103. Lao, *supra* note 85, at 654–55.

104. See Wright, *supra* note 89.

105. See *id.* (noting decisions are “influenced by subjective considerations, prior beliefs, and ideology”).

106. Jonathan B. Baker et al., *Joint Response to the House Judiciary Committee*

Innovation and new technologies are where the battle is most fierce. As traditional manufacturing gave way to a research and development (R&D) based economy, the overlay of innovation tradeoffs to price and output in dynamic markets fuses judicial conservatism, and the wide discretion in antitrust cases ossify enforcement of the law. Professors Alison Jones and William Kovacic observe that these have climaxed into:

[a] widespread debate and intensified demands for a redirection of antitrust policy and the application of other policy instruments to increase competition. High on the agenda is an extension of policy to provide greater control of the practices of leading technology companies (or Tech Giants) and dominant firms in other sectors such as agribusiness and pharmaceuticals.¹⁰⁷

Chicagoans believe dominant firms do a better job of funding large R&D projects and appropriate reinvestment returns through economies of scale and scope.¹⁰⁸ For them, robust property rights ensure technology owners can realize the economic potential of assets.¹⁰⁹ Justice Scalia typified this view when he wrote in *Trinko* that the prospect of charging monopoly prices attracts “business acumen” and “induces risk taking that produces innovation and economic growth.”¹¹⁰ Market intervention could dissuade firms from striving to innovate.¹¹¹ In such cases, intervention may spell catastrophe because innovation fuels economic growth.¹¹²

A judge’s ideology on innovation has a particular salience for antitrust cases involving intellectual property rights. Courts

on the State of Antitrust Law and Implications for Protecting Competition in Digital Markets 5 (Apr. 30, 2020), https://judiciary.house.gov/uploadedfiles/joint_submission_from_michael_kades_and_antitrust_expert_coalition.pdf (“These developments have likely contributed to an increased incidence and exercise of market power across the U.S. economy.”).

107. Alison Jones & William E. Kovacic, *Antitrust’s Implementation Blind Side: Challenges to Major Expansion of U.S. Competition Policy*, 65 ANTITRUST BULL. 227, 228 (2020).

108. See Jonathan B. Baker, *Beyond Schumpeter vs. Arrow: How Antitrust Fosters Innovation*, 74 ANTITRUST L.J. 575, 578 (2007).

109. See *id.* at 593–94.

110. *Verizon Commc’ns, Inc. v. L. Offs. of Curtis V. Trinko, LLP*, 540 U.S. 398, 407 (2004). But see Michael A. Carrier, *Of Trinko, Tea Leaves, and Intellectual Property*, 31 J. CORP. L. 357, 364 (2006) (noting the lack of empirical support for Scalia’s assertion.).

111. See *Trinko*, 540 U.S. at 407.

112. See *id.* at 407–08.

assessing the legality of allegedly anticompetitive conduct rely on hypothesis-driven assessments reflecting ideological biases. Professor Tom Cotter thus observed, “[e]conomic theory is often inconclusive, and observers who bring different ‘priors’ to the table some-times can interpret the evidence in very different ways.”¹¹³ For instance, when intellectual property is concerned, the tendency is for courts to approach efficiencies with greater credulity than anticompetitive effects.¹¹⁴

Conventional wisdom teaches that technological progress is the greatest booster of economic prosperity.¹¹⁵ Innovation fuels dynamic markets and enhances consumer welfare.¹¹⁶ However, how one gets there remains unclear and hotly debated. It is well established that the arc of innovation follows an inverted “U-shape” curve.¹¹⁷ Competition increases innovation but at a decreasing rate.¹¹⁸ Beyond a certain point, the rate of innovation becomes negative with increasing competition.¹¹⁹ This asymmetrical treatment of harms and benefits cannot be justified conceptually based on the relative differences in probabilistic proof strength. The fact that parties may not prove efficiencies does not justify maintaining a different standard of proof based on the judge’s ideology.

Consider how several courts have held that intellectual property rights’ assertion is a “presumptively rational business justification for a unilateral refusal to deal.”¹²⁰ Recently, the most noteworthy involve

113. See Tom Cotter, *Antitrust, Intellectual Property, and Dynamic Efficiency: An Essay in Honor of Herbert Hovenkamp*, CONCURRENCES, N° 3–2020, at 15.

114. See, e.g., *Novell, Inc. v. Microsoft Corp.*, 731 F.3d 1064, 1078 (10th Cir. 2013) (“[E]xperience teaches that the process of firms investing in their own infrastructure and intellectual property and competing rather than colluding normally promotes competition and consumer gains—and the intent to undo a competitor in this process should hardly surprise.”).

115. See Ariel Ezrachi & Maurice E. Stucke, *Digitalisation and Its Impact on Innovation* 3–4 (European Comm’n Rsch. & Innovation Paper Series, Working Paper No. 2020/07, 2020), <https://op.europa.eu/en/publication-detail/-/publication/203fa0ee-e742-11ea-ad25-01aa75ed71a1/language-en> (“The general economic consensus is that by delivering technological improvements, and new products, services, and business models, innovation forms a central pillar to efficient markets and a key to future prosperity and economic growth.”).

116. *Id.* at 4.

117. See Philippe Aghion et al., *Competition and Innovation: An Inverted-U Relationship*, 120 Q.J. ECON. 701, 703 (2005).

118. See *id.*

119. See *id.*

120. *SOLIDFX, LLC v. Jeppesen Sanderson, Inc.*, 841 F.3d 827, 841–43 (10th Cir. 2016) (holding that provider of aviation terminal charts had a valid business justification for refusing to deal with a software developer even after the parties had entered into a license agreement); see, e.g., *In re Indep. Serv. Orgs. Antitrust Litig.*, 203 F.3d 1322, 1329 (Fed. Cir. 2000) (noting that the right is “consistent with both the

conspiracies to delay generic drug entry and the scope of licensing obligations of owners of patents over standardized telecommunications technology who have undertaken to grant access on “fair, reasonable, and nondiscriminatory [(FRAND)] terms.”¹²¹ Adjudicating these cases requires courts to determine if the offensive conduct disrupts the consumer-preference-signaling processes.¹²² Intellectual property owners, usually patentees, will argue about their control over how their rights are exploited, who gets to them, and what terms are critical to incentivizing innovation.¹²³

In *Qualcomm*, the Ninth Circuit favored limiting mandated dealings with rivals, believing they would decrease investment and innovation incentives.¹²⁴ The implied concern is that rivals, assured of access to the proprietary technology, would be less motivated to find a creative alternative.¹²⁵ It was irrelevant to the court whether the industry would perform even better than it did had Qualcomm’s conduct not impeded competition.¹²⁶ The court was reticent “to ascribe

antitrust and the copyright laws”).

121. See Findings of Fact and Conclusions of Law at 2, Fed. Trade Comm’n v. Qualcomm, Inc., 411 F. Supp. 3d 658 (N.D. Cal. 2019) (No. 17–CV–00220–LHK) (“[T]he Alliance for Telecommunications Industry Solutions . . . and the Telecommunications Industry Association . . . require Qualcomm to license to other modem chip suppliers on fair, reasonable, and nondiscriminatory terms . . .”).

122. See, e.g., *id.* at 31 (“MediaTek’s and Intel’s delayed entry into the CDMA modem chip market show that the ‘onerous front-end investments’ required to develop modem chips pose structural entry barriers . . . The inquiry into entry barriers focuses on ‘external factors at work precluding entry into the market,’ rather than the defendant’s conduct.”) (citations omitted); see also Lao, *supra* note 85, at 659 (“While most in the antitrust mainstream would agree that antitrust law should foster (or at least not impede) economic growth and innovation, there is no consensus on the relationship between market structure and innovation.”).

123. See Daniel R. Cahoy, *Patently Uncertain*, 17 NW. J. TECH. & INTELL. PROP. 1, 30 (2019) (“The predictability of property law—which includes the social commitment to the system—reduces the costs of dealing with the extra-legal protection and underground transactions that must accompany informal ownership. Knowing this protection exists permits innovators to allocate costs to other aspects.”).

124. See Fed. Trade Comm’n v. Qualcomm, Inc., 969 F.3d 974, 988, 1005 (9th Cir. 2020).

125. See *Alaska Airlines, Inc. v. United Airlines, Inc.*, 948 F.2d 536, 549 (9th Cir. 1991) (“Every time the monopolist asserts its market dominance” by refusing to grant access to a resource to its competitor, that competitor “has more incentive to find an alternative supplier, which in turn gives alternate suppliers more reason to think that they can compete with the monopolist.”).

126. See *Qualcomm*, 969 F.3d at 1005. The Southern District of New York likewise observed that:

Several federal courts have recognized that certain markets should be characterized as dynamic by reason of constant innovation and other rapid changes, and that analysis of antitrust effects of specific

antitrust liability in these dynamic and rapidly changing technology markets without clearer proof of anticompetitive effect.”¹²⁷ Instead, it cautioned against mistakenly characterizing new technologies and new business strategies as anticompetitive and limited breaches of standard-setting undertakings to patent or contractual remedies.¹²⁸

In filing for an en banc rehearing, the Federal Trade Commission (FTC) pointed to the panel’s disregard of precedent in “elevating patent-law labels over economic substance,” by “holding that harms to Qualcomm’s customers are ‘beyond the scope of antitrust law.’”¹²⁹ The FTC argued that the panel should have seen Qualcomm’s anticompetitive ploy to secure its chip monopoly by penalizing rival product purchases.¹³⁰ In particular, it argued that the court “seriously erred” when it dismissed the lower court’s “findings about the harm to [manufacturers]—including higher prices that are passed on to retail consumers—because [manufacturers] ‘are Qualcomm’s customers, not its competitors.’”¹³¹ However, it will be difficult for the FTC and others to convince the court that it had erred. Those with anti-access (or pro-access) beliefs tend to cherish them viscerally.

Consider also Professor Phillip Areeda’s class critique of the essential facilities doctrine.¹³² While ostensibly trying to preserve incentives to invest, his derisive tone portrayed it as an incursion into

transactions in such markets warrants more particularized consideration than courts accord under traditional economic analysis, to that extent counseling greater caution in judicial intervention.

New York v. Deutsche Telekom AG, 439 F. Supp. 3d 179, 241 (S.D.N.Y. 2020).

127. *Qualcomm*, 969 F.3d at 1003.

128. *Id.* at 1005 (stating “the remedy for such a breach lies in contract and patent law”).

129. Petition of the Fed. Trade Comm’n for Rehearing *En Banc* at 9, 16, Fed. Trade Comm’n v. Qualcomm, Inc., 411 F. Supp. 3d 658 (N.D. Cal. 2019) (No. 17-CV-00220-LHK).

130. *Id.* at 17.

131. *Id.* at 16.

132. See Phillip Areeda, *Essential Facilities: An Epithet in Need of Limiting Principles*, 58 ANTITRUST L.J. 841, 852–53 (1990) (“offering six principles that should limit application of the essential facilities concept”). The doctrine mandates access to an indispensable asset, such as a port facility, railroad, or standardized technology, where denial could cause anticompetitive harm. See *Verizon Commc’ns, Inc. v. L. Offs. of Curtis V. Trinko, LLP*, 540 U.S. 398, 410–11 (2004). Many other countries do follow an essential facilities approach, making the US approach somewhat *sui generis*. See, e.g., James Turney, *Defining the Limits of the EU Essential Facilities Doctrine on Intellectual Property Rights: The Primacy of Securing Optimal Innovation*, 3 NW. J. TECH. & INTELL. PROP. 179, 179–80 (2005) (explaining a decision by the European Commission that applied the “essential facilities [doctrine] in the context of intellectual property rights”).

property rights and warned “[t]he trouble with . . . the essential facilities notion is that [it] start[s] with the assumption that all business assets are subject to sharing.”¹³³ Then, he asks rhetorically, “[d]o we really want to assume that everything we have is up for grabs?”¹³⁴ Similarly, those beliefs transcend the subject matter of the case and have a broader application. Thus, Professor Daniel Cahoy expressed that “[a] firm is much less likely to invest in a manufacturing facility in a country in which such private property is subject to nationalization [T]he impact of reduced property incentives is relevant to innovators whether in the realm of physical or intellectual.”¹³⁵

The result is that plaintiffs pursuing antitrust remedies—whether agencies, states, or private entities—must cross a high bar, particularly for exclusion and the duty to deal with rivals. Chicago overemphasizes the risk and cost of false positives while overlooking the risk and cost of false negatives.¹³⁶ The resulting low to non-existent antitrust checks against patent exploitation results in systemically broad patent rights that impede follow-on innovators and exert an unjustified tax on consumers.¹³⁷

In the decades since Chicago’s ascendancy, the scholarly debate has focused on redefining antitrust’s goals, exemplified by Post-Chicago theories such as raising rival costs, but generally adhering to Chicago’s platform of economic-focused discourse.¹³⁸ The growing concern over the market power in the 1990s through the 2000s by Microsoft’s operating systems gave new energy to theories of network effects and customer switching costs.¹³⁹

Post-Chicagoans offered these as evidence to support their assertion that innovation involves many contributors and warned of a “monoculture risk” without robust antitrust enforcement.¹⁴⁰ When

133. Areeda, *supra* note 132, at 852 n.46.

134. *Id.*; see also Lao, *supra* note 85, at 679 (“The language of [Professor Areeda’s] statements reflects a disdain for the essential facilities doctrine that is evidently based more on a sense of the sanctity of property rights than on the economics of the duty to deal.”).

135. Cahoy, *supra* note 123.

136. See Howard A. Shelanski, *The Case for Rebalancing Antitrust and Regulation*, 109 MICH. L. REV. 683, 711 (2011).

137. See *id.*

138. See Thomas G. Krattenmaker & Steven C. Salop, *Anticompetitive Exclusion: Raising Rivals’ Costs to Achieve Power over Price*, 96 YALE L.J. 209, 213–14 (1986).

139. See Baker et al., *supra* note 106, at 4 (“[T]he economic studies indicating that market power has grown over time suggest that it has increased particularly among firms that extensively employ information technology, both in information technology industries themselves and elsewhere in the economy.”).

140. See Kenneth J. Arrow, *Economic Welfare and the Allocation of Resources for Invention*, in THE RATE AND DIRECTION OF INVENTIVE ACTIVITY: ECONOMIC AND

farmers plant just one crop variety, its failure leads to devastation. Monopolists extract maximum profits and have less incentive to innovate, and intervention spurs innovation and economic growth.¹⁴¹ In contrast, mandatory sharing would “unleash innovation and competition from the dominant firm’s rivals, particularly in complementary markets, which ought to be taken into account in the calculus of the total effects of compulsory access on incentives to innovate and on actual useful innovation.”¹⁴² In fact, this was the district court’s view in *Qualcomm* when it held that Qualcomm’s refusal to license its technologies to rival chipmakers—its “no license, no chips” policy—and its “unreasonable” royalty rates violated antitrust law.¹⁴³

However, without a rudder or compass, Post-Chicagoans may be just as likely to over-enforce antitrust law against intellectual property rights owners, as Chicagoans have been in under-enforcing it.¹⁴⁴ In this regard, Cotter cautions that “no one knows precisely how to craft IP rights to attain the hypothetical ideal at which they produce the maximum surplus of social benefits over social costs; and we certainly cannot expect antitrust enforcers, of all people, to try making such decisions on a case-by-case basis.”¹⁴⁵ Patents fall short of achieving a social optimum by being too weak or too strong, defined by ideology, and unverified by facts.

Studies show that businesses make overly optimistic predictions about their future success, including factors such as efficiencies that they could capture from mergers or otherwise anticompetitive conduct, and judges believe them.¹⁴⁶ It is one reason plaintiffs end up

SOCIAL FACTORS 609, 619 (Nat’l Bureau Comm. for Econ. Rsch., Comm. on Econ. Growth of the Soc. Sci. Rsch. Council ed., 1962); see also ANDREW VAN DE VEN ET AL., *THE INNOVATION JOURNEY* (Amy C. Edmondson ed., 1999) (reviewing examples in a longitudinal study and noting its seeming arbitrariness).

141. See Steven C. Salop & R. Craig Romaine, *Preserving Monopoly: Economic Analysis, Legal Standards, and Microsoft*, 7 GEO. MASON L. REV. 617, 662 (1999).

142. Lao, *supra* note 85, at 662.

143. See Fed. Trade Comm’n v. Qualcomm, Inc., 411 F. Supp. 3d 658, 658, 738 (N.D. Cal. 2019), *rev’d and vacated*, 969 F.3d 974 (9th Cir. 2020).

144. See Cotter, *supra* note 113, at 2.

145. *Id.*

146. See Jonathan S. Baker & Carl Shapiro, *Detecting and Reversing the Decline in Horizontal Merger Enforcement*, 22 ANTITRUST 29, 33 (2008) (“There is considerable evidence that acquiring firms are systematically over-optimistic about the efficiencies they can achieve through acquisition. This evidence does not support the view that merger-specific efficiencies are common or that claims of efficiencies made by merging parties should generally be credited.”). See generally Anand Mohan Goel & Anjan V. Thakor, *Rationality, Overconfidence and Leadership* 3–4 (Univ. of Mich. Bus. Faculty Rsch., Paper No. 00-022, 2000), <http://deepblue.lib.umich.edu/bitstream/2027.42/35648/2/b2034712.0001.001.pdf> (showing that overconfident managers are more likely to be selected as leaders than less confident managers).

bearing an amplified burden of persuasion in proving anticompetitive harm.¹⁴⁷ Professor Cass Sunstein cautioned against this “paralyzing” result because it stymies intervention.¹⁴⁸ If requiring intellectual property owners to change their business practices may create a 10% risk, a hundred people will benefit, and there will be a 10% probability that a hundred people will be harmed. A rational algorithm may see that introducing the new practice benefits a hundred people and should therefore intervene. A judge, weighing losses more heavily than gains, may not.

Handicapped by the inability to contemplate an increasing flood of data from increasingly complex and dynamic markets, courts, whether guided by Chicago, Harvard, or Post-Chicago Schools, leaned on their ideology of choice as a convenient heuristic.¹⁴⁹In these instances, Cotter observes that:

[T]he end result can vary dramatically, depending on the facts. And while the evidence may never be clear enough for enforcers to attain absolute certainty about the future course of innovation, it is surely better to rely on the evidence, such as it is, than to make policy based on a priori assumptions.¹⁵⁰

For instance, Post-Chicago models assume decisions must be made in a particular order.¹⁵¹ Accordingly, Professor Christopher Yoo observes that “[t]he dependence of these models on these restrictive assumptions often makes them susceptible to large, discontinuous changes in response to small changes to the underlying parameters.”¹⁵² At the heart of these parameters lie counterfactuals, which are inherent in every antitrust case.

147. Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1003 (2003).

148. *See id.*

149. Cotter, *supra* note 113, at 13.

150. *Id.*

151. *See* Malcolm B. Coate & Jeffrey H. Fischer, *Can Post-Chicago Economics Survive Daubert?*, 34 AKRON L. REV. 795, 797 (2001) (“[T]he outcome of a [Post-Chicago economics] model often depends on whether customers or competitors can undertake strategies to counter the alleged anticompetitive behavior. In other cases, the order in which the parties execute strategies is important.”).

152. Christopher S. Yoo, *The Post-Chicago Antitrust Revolution: A Retrospective*, 168 U. PA. L. REV. 2145, 2162 (2020), https://scholarship.law.upenn.edu/faculty_scholarship/2237; *see also* Coate & Fischer, *supra* note 151, at 823 (“[Post-Chicago] theories are highly sensitive to the assumptions used.”)

4. Indeterminacy of Counterfactuals

Counterfactuals are embedded in the rule of reason since every balancing exercise requires judges to consider a world without the alleged pro- and anti-competitive effects. To simplify the balancing, courts in antitrust law's early days devised per se rules by using the damning presence of an agreement to fix prices and the like as a heuristic of market inefficiency without engaging in that counterfactual exercise, giving defendants no opportunity to prove the value of those restraints.¹⁵³ A judge's unfamiliarity with the industry at issue was less of an impediment as it would be able to apply precedent across industries, or, as the Supreme Court wrote, it "establishes one uniform rule applicable to all industries alike."¹⁵⁴ Indeed, courts have noted that, far from being a reason not to apply the per se rule, a judge's lack of experience in that industry was precisely the reason why they should do so.¹⁵⁵

[L]ike the tide receding from the shoreline, the receding cover of per se rules left lower courts the unenviable task of weighing counterfactuals based on shifting social and economic theories, leaving [practitioners worried that] more and more adjudication [would take] place under conditions of ignorance and uncertainty due to imperfect information and [] limited capacity for cognition.¹⁵⁶

153. See *United States v. Joyce*, 895 F.3d 673, 677–78 (9th Cir. 2018) (quoting *N. Pac. Ry. Co. v. United States*, 356 U.S. 1, 5 (1958)) ("The very purpose of the per se rule is to 'avoid[] the necessity for an incredibly complicated and prolonged economic investigation into the entire history of the industry involved, as well as related industries, in an effort to determine at large whether a particular restraint has been unreasonable.'"); John M. Yun, *Are We Dropping the Crystal Ball? Understanding Nascent & Potential Competition in Antitrust*, 104 MARQ. L. REV. 613, 639 (2021) ("Thus, the act itself is sufficient to find a violation. No explicit counterfactual exercise is needed.").

154. *Arizona v. Maricopa Cnty. Med. Soc'y*, 457 U.S. 332, 333 (1982) (quoting *United States v. Socony-Vacuum Oil Co.*, 310 U.S. 150, 222 (1940)) (applying the per se rule to a price-fixing agreement among health care providers).

155. See *id.* at 333, 349–50.

156. Lim, *supra* note 39, at 42; see also Jonathan Jacobson & Christopher Mufarrige, *Acquisitions of "Nascent" Competitors*, ANTITRUST SOURCE, Aug. 2020, at 1, 11, <https://www.wsgr.com/a/web/28843/jacobson-0820.pdf> ("These questions are complex enough standing alone, but the contexts in which they arise exacerbate their complexity. Much competition in tech is indirect. Firms often look nothing like each other, but have actual and substantial impacts on each other's business.").

By 1977, the Supreme Court declared, “[p]er se rules of illegality are appropriate only when they relate to conduct that is manifestly anticompetitive.”¹⁵⁷ In *Leegin*, for instance, the Court emphasized its general reluctance to apply the per se rule unless the courts “can predict with confidence that the restraint would be invalidated in all or almost all instances under the rule of reason.”¹⁵⁸ In contrast, four dissenting justices maintained there were anticompetitive risks with resale price maintenance such as diminishing price competition among dealers of a single brand as well as reinforcing tacit collusion.¹⁵⁹

Under circumstances of ignorance and uncertainty, the burden of proving the counterfactual becomes decisive. The work of scholars like Professors Rebecca Allensworth and Michael Carrier reveal courts rarely conduct any balancing at all, with courts in the last decade omitting the balancing step altogether.¹⁶⁰ Defendants who offer some procompetitive benefit are exonerated even if plaintiffs succeed in showing anticompetitive harm.¹⁶¹ This risk of systemically prejudicing plaintiffs may well have been why the Supreme Court devised per se rules in the first place.

Two cases from the same court—the United States Court of Appeals for the D.C. Circuit—illustrate three points: 1) the decisive nature of this burden of proof 2) the indeterminacy of precedent,¹⁶² and 3) judges’ inability to properly perform analogical reasoning because the Chicagoan formulation of the rule of reason makes precedent easy to ignore.¹⁶³ In *Microsoft*, the court held that even a modest probability of a detrimental outcome should warrant placing the burden on the defendant.¹⁶⁴ Otherwise, it reasoned, defendants may have the perverse incentive “to take more and earlier anticompetitive action.”¹⁶⁵ As the court put it:

157. *Cont'l T.V., Inc. v. GTE Sylvania, Inc.*, 433 U.S. 36, 49–50 (1977).

158. *Leegin Creative Leather Prods., Inc. v. PSKS, Inc.*, 551 U.S. 877, 877–78 (2007).

159. *See id.* at 910–11 (Breyer, J., dissenting).

160. *See* Rebecca Haw Allensworth, *The Commensurability Myth in Antitrust*, 69 VAND. L. REV. 1, 5 n.7 (2016) (“The Rule of Reason . . . [is] a standard that balances pro- with anticompetitive effects”); Michael A. Carrier, *The Real Rule of Reason: Bridging the Disconnect*, 1999 BYU L. REV. 1265, 1267–68 (1999) (finding that actual balancing is quite rare).

161. *See* Carrier, *supra* note 160, at 1279; Newman, *supra* note 9.

162. *See supra* Part I.A.2.

163. *See supra* Part I.A.3.

164. *See* *United States v. Microsoft Corp.*, 253 F.3d 34, 59 (D.C. Cir. 2001); *see also* FURMAN ET AL., *supra* note 25, at 13, 99–100 (advocating a “balance of harms” approach that condemns mergers resulting in harm in expected value terms and criticizing a more-likely-than-not test as “unduly cautious”).

165. *Microsoft Corp.*, 253 F.3d at 79 (“Microsoft points to no case, and we can find

[N]either plaintiffs nor the court can confidently reconstruct a product's hypothetical technological development in a world absent the defendant's exclusionary conduct. To some degree, "the defendant is made to suffer the uncertain consequences of its own undesirable conduct." . . . [I]t would be inimical to the purpose of the Sherman Act to allow monopolists free reign to squash nascent, albeit unproven, competitors at will—particularly in industries marked by rapid technological advance and frequent paradigm shifts¹⁶⁶

However, less than a decade later, in *Rambus*, the court abruptly required the government to bear the burden of overcoming that uncertainty and found that the government failed to prove but-for causation.¹⁶⁷ *Rambus* "has been criticized, both on the basis of its antitrust analysis and as a matter of public policy, inasmuch as it failed to sanction conduct that was widely condemned as deceptive."¹⁶⁸ As Professors Jay Kesan and Carol Hayes observed, the *Rambus* holding "is potentially broad enough to restrict or eliminate the application of antitrust law in cases involving patents that are part of a standard."¹⁶⁹ The *Rambus* court also ignored *Microsoft's* rejection of a "but-for" standard and who took the reins of monopoly power or how they obtained that power, despite Supreme Court precedent teaching that efforts to obscure "information desired by consumers for the purpose of determining whether a particular purchase is cost justified is likely enough to disrupt the proper functioning of the price-setting mechanism of the market that it may be condemned" under antitrust law.¹⁷⁰

Mergers and acquisitions add new dimensions to the rule of reason analysis. The analysis typically compares a hypothetical market outcome with the merger or acquisition to a hypothetical market

none, standing for the proposition that, as to § 2 liability in an equitable enforcement action, plaintiffs must present direct proof that a defendant's continued monopoly power is precisely attributable to its anticompetitive conduct.")

166. *Id.* at 79 (quoting 3 PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW ¶ 651c, at 78 (3d ed. 1996)).

167. See *Rambus, Inc. v. Fed. Trade Comm'n*, 522 F.3d 456, 466 (D.C. Cir. 2008).

168. Jorge L. Contreras, *Implementing Procedural Safeguards for the Development of Bioinformatics Interoperability Standards*, 39 N. KY. L. REV. 87, 105 (2012).

169. Jay P. Kesan & Carol M. Hayes, *FRAND's Forever: Standards, Patent Transfers, and Licensing Commitments*, 89 IND. L.J. 231, 269 (2014).

170. *Fed. Trade Comm'n v. Ind. Fed'n of Dentists*, 476 U.S. 447, 461–62 (1986).

outcome without it.¹⁷¹ Courts often stampede the efficiency of mergers once they determine possible anticompetitive effects. In a study of twenty-three U.S. merger cases litigated between 1986 and 2009, Jamie Moffitt reported that “[a]lthough courts claim to be balancing merger-generated efficiencies with other negative factors affecting market competition,” they are actually “making an assessment of the relevant concentration in the applicable market and then allowing that initial assessment to color their recognition of claimed efficiencies.”¹⁷²

Even in successful cases, controversy persists. For instance, the Justice Department’s breakup of AT&T has been lauded by a European Commission report for “unleashing innovation,”¹⁷³ and Professor John Lopatka panned its intervention with IBM as “the greatest waste of resources in the history of antitrust enforcement.”¹⁷⁴ Professors Ariel Ezrachi and Maurice Stucke push back, however, arguing that the IBM case may have “opened a competitive portal, namely IBM’s decision to unbundle software from its computers, which enabled software development to flourish.”¹⁷⁵ Similarly, they argue that prosecutions of Microsoft in the 1990s–2000s “provided a competitive portal for Google’s browser and search engine, and Facebook’s social network.”¹⁷⁶

More recently, in 2019, the Justice Department lost its challenge to the AT&T/Time Warner transaction by failing to convince a federal district court and the subsequent appeals court that the merger may substantially lessen competition.¹⁷⁷ AT&T’s argument that the firm would not be able to use the merger to gain leverage over customers and hike costs prevailed over the government’s predictions about how AT&T would exercise its newfound bargaining power.¹⁷⁸ Within months, AT&T shut down HBO access to Dish.¹⁷⁹ Similarly, while

171. See, e.g., *Brown Shoe Co. v. United States*, 370 U.S. 294, 323 (1962) (“Congress used the words ‘*may be substantially to lessen competition*’ (emphasis supplied), to indicate that its concern was with probabilities, not certainties. Statutes existed for dealing with clear-cut menaces to competition; no statute was sought for dealing with ephemeral possibilities.”).

172. Jamie Henikoff Moffitt, *Merging in the Shadow of the Law: The Case for Consistent Judicial Efficiency Analysis*, 63 VAND. L. REV. 1697, 1698 (2010).

173. Ezrachi & Stucke, *supra* note 115, at 31.

174. John E. Lopatka, *United States v. IBM: A Monument to Arrogance*, 68 ANTITRUST L.J. 145, 146 (2000).

175. Ezrachi & Stucke, *supra* note 115, at 32.

176. *Id.*

177. See *United States v. AT&T, Inc.*, 916 F.3d 1029, 1046–47 (D.C. Cir. 2019); *United States v. AT&T, Inc.*, 310 F. Supp. 3d 161, 165 (D.D.C. 2018).

178. See *AT&T, Inc.*, 310 F. Supp. 3d at 199.

179. See Klint Finley, *HBO Goes Dark on Dish. Monopolist Move, or Publicity Stunt?*, WIRED (Nov. 1, 2018, 6:40 PM), <https://www.wired.com/story/hbo-dark-dish->

AT&T pledged the transaction would enable it to lower consumer prices,¹⁸⁰ AT&T increased prices instead by as much as 50%.¹⁸¹

When the case involves acquisitions targeting companies in the early stages of product development, the merger analysis must not only forecast a world where something has not yet happened, but it must do so without the data points that a history of actual marketplace competition provides.¹⁸² There are usually no direct competitors to the acquired companies to challenge these acquisitions, and harm to the acquirers' competitors may be too speculative at that point.¹⁸³ In these instances, scholars and enforcers caution against enforcement, given "the uncertain growth potential associated to the target involved."¹⁸⁴

This outcome is parallel to the problem of assessing innovation effects in intellectual property cases. We cannot know if the acquisition precluded greater competitive R&D that might have happened but for the acquisition compared to the funding benefits resulting from the acquired from the acquirer. Nonetheless, the law requires judges to combine muddled precedent and guesswork to reach legally enforceable conclusions that affect not just the parties before them but, through the precedential force of their own opinions, those in other industries for years to come. Given how impossible these counterfactual inquiries are, one option is to give up on antitrust

monopolist-move-publicity-stunt/.

180. Post-Trial Brief of Defendants AT&T Inc., DirecTV Grp. Holdings, LLC, and Time Warner, Inc. at 6, 13, *United States v. AT&T, Inc.*, 310 F. Supp. 3d 161 (D.D.C. 2018) (No. 17-2511 (RJL)) ("The merger . . . enabl[es] AT&T and Time Warner to reduce consumer prices [because] certain merger efficiencies will begin exerting downward pressure on consumer prices almost immediately.").

181. See Jon Brodtkin, *AT&T Hits Online TV Customers with Second Big Price Increase This Year*, ARS TECHNICA (Oct. 18, 2019, 2:56 PM), <https://arstechnica.com/information-technology/2019/10/att-hits-online-tv-customers-with-second-big-price-increase-this-year/>; Chris Welch, *AT&T Confirms Drastic Changes to DirecTV Now and Raises Cheapest Plan to \$50*, VERGE (Mar. 13, 2019, 10:48 AM), <https://www.theverge.com/2019/3/13/18263839/att-directv-now-2019-channel-changes-hbo-plan-price>.

182. See C. Scott Hemphill & Tim Wu, *Nascent Competitors*, 168 U. PA. L. REV. 1879, 1887 (2020) ("Whether that innovation will make a difference in the marketplace is subject to significant uncertainty. That is due to the unpredictable rate and direction of technological change.")

183. See *id.* at 1907.

184. Carolina Destailleux G.B. Bueno et al., *Killer Acquisitions: Is Antitrust Prepared to Deal with Innovative Young Rivals?*, 2 MULHERES NO ANTITRUSTE 26, 30, 34 (2019) (quoting Maureen K. Ohlhausen, Fed. Trade Comm'n Acting Chairman, Opening Keynote at the ABA 2017 Consumer Protection Conference (Feb. 2, 2017)), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3644593 (warning that "the agency should not focus on speculative injury or on speculative types of harm").

enforcement.¹⁸⁵

Ending antitrust enforcement is exactly what supporters of “killer acquisitions” argue—whether users would be even better off without the acquisition is speculative.¹⁸⁶ They have argued that “the ability of the enforcer to predict technological changes and synergies in assessing the future pro- and anti-competitive effect of a transaction” is a key challenge.¹⁸⁷ Instead, they praise these acquisitions for unleashing new features to improve product offerings, providing greater access to research and development capabilities, supplying the acquired firm’s users with greater support, and rewarding venture capitalists.¹⁸⁸ For instance, when Facebook acquired Instagram, Instagram had no revenue and a few employees.¹⁸⁹ Thirty million Instagram users grew to one billion, and Facebook users increased from 900 million to two billion simultaneously.¹⁹⁰ Facebook’s experience managing user volume and infrastructure access allowed Instagram to expand output and manage the content accompanying this explosive growth.¹⁹¹

However, it is also possible that competitive pressures from nascent rivalry increase the incumbent’s competitive pressure to innovate in anticipation, pushing antitrust law toward prohibiting killer acquisitions. Empirical work by Carolina Destailleur G.B. Bueno et al. models killer acquisitions and illustrates how an incumbent firm buys it before it can undermine its dominance, thereby disrupting the industry.¹⁹² They argue that:

185. An alternative to giving up enforcement is to return to per se rules. *See infra* Part II (detailing how AI makes this alternative possible).

186. *See* Jacobson & Mufarrige, *supra* note 156, at 9 (“The empirical evidence we have of the various acquisitions that critics claim are problematic suggests a substantial increase in output post-merger.”).

187. Ezrachi & Stucke, *supra* note 115, at 71.

188. Jacobson & Mufarrige, *supra* note 156, at 1.

189. *Id.* at 6; *see* Victor Luckerson, *Here’s Proof That Instagram Was One of the Smartest Acquisitions Ever*, TIME (Apr. 19, 2016, 12:31 PM), <https://time.com/4299297/instagram-facebook-revenue/>; Evelyn M. Rusli, *Facebook Buys Instagram for \$1 Billion*, N.Y. TIMES: DEALBOOK, (Apr. 9, 2012, 1:15 PM), <https://dealbook.nytimes.com/2012/04/09/facebook-buys-instagram-for-1-billion>.

190. Jacobson & Mufarrige, *supra* note 156, at 6; *see* Luckerson, *supra* note 189; *Facebook: Number of Monthly Active Users Worldwide 2008-2021*, STATISTA, <https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide> (last visited Feb. 26, 2022); *Number of Monthly Active Instagram Users 2013-2021*, STATISTA, <https://www.statista.com/statistics/253577/number-of-monthly-active-instagram-users/> (last visited Feb. 26, 2022).

191. Jacobson & Mufarrige, *supra* note 156, at 7.

192. *See* Destailleur G.B. Bueno et al., *supra* note 184, at 30 (“The scenario in which small companies reach the point of exponential growth is exactly what killer acquisitions aim to avoid . . . [T]he companies’ growth levels increase so significantly . . . that they will soon replace once dominant companies in the market which did not

[E]ven though it is unforeseeable which projects could have been further developed and useful for society if the target had not been acquired at an early stage, and which ones could not, considering that the market and consumers might be significantly affected by these transactions, antitrust authorities should be worried or at least vigilant on this situation.¹⁹³

Nascent rivals compete for the market, not merely within the market¹⁹⁴. A bias toward intervention would aid dynamic efficiency since innovation may be the only way to dislodge the incumbent.¹⁹⁵

In sum, ad hoc adjudication has yielded indeterminate antitrust rules over decades, undermining the rule of law.¹⁹⁶ As more administrable per se rules gave way to the pliable rule of reason analysis, it has also devolved beyond judicial competence to apply.¹⁹⁷ Unelected judges devising legal rules “as they see fit” is democratically illegitimate.¹⁹⁸ Congress never intended the Sherman Act to be a “consumer welfare prescription,” yet that is what the Supreme Court declared.¹⁹⁹ Businesses left to flounder in uncertain

keep up with the technological development in course.”).

193. *Id.* at 36.

194. Hemphill & Wu, *supra* note 182.

195. *See id.* (providing the example of “a new platform for developing software or decoding a genome”).

196. *See generally* Fed. Comm’n Comm’n v. Fox Television Stations, Inc., 567 U.S. 239, 253 (2012) (explaining that a lack of fair notice raises constitutional due process concerns). As the Supreme Court has explained, fair notice concerns arise when a law or regulation “fails to provide a person of ordinary intelligence fair notice of what is prohibited, or is so standardless that it authorizes or encourages seriously discriminatory enforcement.” *Id.* (quoting *United States v. Williams*, 553 U.S. 285, 304 (2008)).

197. *See, e.g.*, Fed. Trade Comm’n v. Actavis, Inc., 570 U.S. 136, 173 (2013) (Roberts, C.J., dissenting) (quoting *Actavis, Inc.*, 570 U.S. at 149 (majority opinion)) (“[T]he majority declares that such questions should henceforth be scrutinized by antitrust law’s unruly rule of reason. Good luck to the district courts that must, when faced with a patent settlement, weigh the ‘likely anticompetitive effects, redeeming virtues, market power, and potentially offsetting legal considerations present in the circumstances.’”); *Leegin Creative Leather Prods., Inc. v. PSKS, Inc.*, 551 U.S. 877, 916 (2007) (Breyer, J., dissenting) (“How easily can courts identify instances in which the benefits are likely to outweigh potential harms? My own answer is, *not very easily.*”).

198. *See* Harry First & Spencer Weber Waller, *Antitrust’s Democracy Deficit*, 81 *FORDHAM L. REV.* 2543, 2549 (2013).

199. *See* *Reiter v. Sonotone Corp.*, 442 U.S. 330, 343 (1979) (quoting BORK, *supra* note 50) (“Congress designed the Sherman Act as a ‘consumer welfare prescription.’”); Khan, *supra* note 24, at 1679 (noting how the Supreme Court overrode “a clear legislative record with a fictitious account that remains law today”).

rules will fail in complying with antitrust law. Worse, permissive precedents discourage private suits and government enforcement even in facially meritorious cases, emboldening dominant businesses to the detriment of non-dominant ones.²⁰⁰ If the rule of reason represents antitrust law's operating system, its code is written in Chicagoan logic programming. Understanding Chicago's logic is, therefore, crucial in reforming its flaws.

B. Chicago's Rule

It is difficult to overstate the Chicago School's sweeping impact on nearly every facet of antitrust. Courts eliminated challenges to unilateral refusals to deal and predatory pricing claims,²⁰¹ readily presumed monopolies promote innovation,²⁰² forced plaintiffs to prove market output reductions while ignoring price increases,²⁰³ insulated horizontal mergers from challenge in markets with more than a handful of rivals,²⁰⁴ accepted self-interested testimony of defendants' executives inconsistent with economic reasoning and documentary evidence,²⁰⁵ systematically favored defendants in vertical restraints

200. See, e.g., Baker et al., *supra* note 106 ("Each of those mistaken assumptions leads courts to underestimate the likelihood [of] antitrust violations and the resulting harm.").

201. See, e.g., *Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 223, 227 (1993) (warning of the "intolerable risks of chilling legitimate price-cutting" and asserting that below-cost pricing and recoupment is unsustainable); *Novell, Inc. v. Microsoft Corp.*, 731 F.3d 1064, 1072–73 (10th Cir. 2013) (explaining that "today a monopolist is much more likely to be held liable for failing to leave its rivals alone than for failing to come to their aid" and defending a "presumption of legality" for unilateral conduct).

202. See, e.g., *Verizon Commc'ns, Inc. v. L. Offs. of Curtis V. Trinko, LLP*, 540 U.S. 398, 407 (2004) (construing the Sherman Act to "safeguard the incentive to innovate" by allowing firms to exercise monopoly power); see also Giulio Federico et al., *Antitrust and Innovation: Welcoming and Protecting Disruption*, 20 INNOVATION POL'Y & ECON. 125, 155–56 (2020) (discussing the "fallacy" of inferring the absence of exclusionary conduct from the presence of market improvements).

203. See *Ohio v. Am. Express Co.*, 138 S. Ct. 2274, 2285 n.7 (2018) (requiring plaintiffs to prove vertical restraints harm competition in a market encompassing both a two-sided market and rejecting proof of direct evidence by requiring market definition to evaluate defendant market power); see also *id.* at 2297 (Breyer, J., dissenting) ("The majority . . . seems categorically to exempt vertical restraints from the ordinary 'rule of reason' analysis that has applied to them since the Sherman Act's enactment in 1890.").

204. See William E. Kovacic, *Assessing the Quality of Competition Policy: The Case of Horizontal Merger Enforcement*, 5 COMPETITION POL'Y INT'L 129, 143–44 (2009) (describing the relaxation of the threshold number of significant post-merger competitors, prompting agency scrutiny of horizontal mergers from the 1960s through the 2000s, which was influenced by changing judicial standards).

205. Baker et al., *supra* note 106, at 5–6 n.22.

litigation,²⁰⁶ and expanded their ability to grant defendants immunity from the antitrust laws.²⁰⁷

Once Chicagoans denied the plausibility of anticompetitive harm from foreclosure and secondary market leverage, courts readily found allegedly anticompetitive refusals to deal, exclusive dealing, and tying implausible.²⁰⁸ Antitrust minimalism was supported by its resounding faith in efficient business conduct and self-correcting markets, and against that, the potential for penalizing innovation and success.²⁰⁹ Chicagoans tout, without evidence, how acquisitions add useful features to existing products consumers favor, as well as “a valuable exit ramp for investors, encouraging future investments in innovation.”²¹⁰

That Chicago failed on its terms has become increasingly clear.²¹¹ For years, scholars warned against seduction by laissez-faire.²¹² Laissez-faire antitrust has spawned a systemic increase in market

206. See Ginsburg, *supra* note 38.

207. See, e.g., *Credit Suisse Sec. (USA), LLC v. Billing*, 551 U.S. 264, 264 (2007) (precluding the application of antitrust laws because securities laws are incompatible with them); see also Howard Shelanski, *Antitrust and Deregulation*, 127 YALE L.J. 1922, 1943 (2018) (“*Credit Suisse* . . . went beyond prior implied immunity cases to establish a rule that blocks some claims even when they rely on legitimate antitrust principles, are consistent with securities laws, and, correctly read, would not interfere with the applicable regulatory scheme”).

208. See Jonathan B. Baker, *Taking the Error out of “Error Cost” Analysis: What’s Wrong with Antitrust’s Right*, 80 ANTITRUST L.J. 1, 2–3 n.7 (2015) (citing BORK, *supra* note 50, at 156) (discussing that Bork realized “that disruption of optimal distribution patterns could, in theory, harm competition, but he suggested that anticompetitive outcomes were implausible”).

209. See Jacobson & Mufarrige, *supra* note 156, at 15 (“It would penalize the independent development antitrust encourages and would deter even the most beneficial mergers. Intervention post-merger should focus on instances where innovation has slowed, prices increased, or user growth stalled.”).

210. *Id.* at 1.

211. See, e.g., Kovacic, *supra* note 35, at 462–63 (“In its wake, the Chicago School is said to have left vast wreckage: a damaged economy featuring high and growing industrial concentration, and democratic institutions endangered by unaccountable corporate leviathans and their internal puppets at the federal enforcement authorities”).

212. See Marina Lao, *No-Fault Digital Platform Monopolization*, 61 WM. & MARY L. REV. 755, 759 (2020) (“After decades of judicial and agency permissiveness in merger enforcement and in the application of section 2 of the Sherman Act, the law that prohibits monopolization, many are calling for a new antitrust equilibrium.”).

concentration,²¹³ declining competition,²¹⁴ increase in markups,²¹⁵ diminishing investments in innovation relative to profits,²¹⁶ as well as reduced business dynamism and fewer new entrants.²¹⁷

Others have gone further by blaming antitrust law's failure to ensure its citizens fair access to the nation's economic prosperity and to safeguard the sound functioning of democracy itself.²¹⁸ As market concentration and profit margins increased, so did the skew in income distribution and stagnant and virtually non-existent wage growth.²¹⁹ Opportunity costs of foregone innovation or excluded competitors usually cannot be reclaimed. These trends can be traced to the 1980s, according to Hovenkamp, "about the same time that Bork's book was published and United States antitrust law began a significant rightward turn."²²⁰

In October 2020, a 450-page Democratic congressional staff report recommended changes to antitrust laws to combat the tech titan companies' perceived problems, such as legislatively overriding "problematic precedents" in antitrust case law.²²¹ The House report contains findings and recommendations that the Judiciary's Democratic-led House antitrust subcommittee produced in response

213. See ADIL ABDELA & MARSHALL STEINBAUM, ROOSEVELT INST., *THE UNITED STATES HAS A MARKET CONCENTRATION PROBLEM 1* (2018), <https://rooseveltinstitute.org/wp-content/uploads/2020/07/RI-US-market-concentration-problem-brief-201809.pdf>; WU, *supra* note 52, at 114–17 (detailing concentration levels in major industries such as airlines, pharmaceuticals, and telecommunications).

214. See Jones & Kovacic, *supra* note 107 ("By failing to protect competition, the federal antitrust enforcement agencies and the courts are said to have damaged the economy severely."); Lao, *supra* note 212.

215. See Jan De Loecker, Jan Eeckhout & Gabriel Unger, *The Rise of Market Power and the Macroeconomic Implications*, 135 Q.J. ECON. 561, 561 (2020).

216. See Germán Gutiérrez & Thomas Philippon, *Declining Competition and Investment in the U.S.* 2 (Nat'l Bureau of Econ. Rsch., Working Paper No. 23583, 2017).

217. See Joshua Gans et al., *Inequality and Market Concentration, When Shareholding Is More Skewed than Consumption* 2 (Nat'l Bureau of Econ. Rsch., Working Paper No. 25395, 2018).

218. See Khan, *supra* note 24, at 1677–78 ("This lopsided attention seems to reflect, in part, the degree to which economic analysis now dominates antitrust.").

219. See JONATHAN B. BAKER, *THE ANTITRUST PARADIGM* 21–22 (2019) (stating that an increase in the number of firms exercising monopoly power in labor markets could depress wages); THOMAS PIKETTY, *CAPITAL IN THE TWENTY-FIRST CENTURY* 24 (Arthur Goldhammer trans., 2014) (reporting rising income inequality from 1970 to 2010).

220. Herbert Hovenkamp, *Is Antitrust's Consumer Welfare Principle Imperiled?*, 45 J. CORP. L. 101, 109 (2019), <https://ssrn.com/abstract=3197329>.

221. JERROLD NADLER & DAVID N. CICILLINE, SUBCOMM. ON ANTITRUST, COM. & ADMIN. L. OF THE COMM. ON THE JUDICIARY, *INVESTIGATION OF COMPETITION IN DIGITAL MARKETS* 6–7, 21 (2020), https://fm.cnb.com/applications/cnbc.com/resources/editorialfiles/2020/10/06/investigation_of_competition_in_digital_markets_majority_staff_report_and_recommendations.pdf.

to Amazon, Google, Facebook, and Apple's business practices.²²² There seems to be a bipartisan consensus in shifting the burden of proof for companies pursuing mergers and acquisitions in an age of hopelessly partisan politics. "[H]aving dominant American tech firms is a strategic advantage in [America's geopolitical] contest with China."²²³

Proponents of change, both inside Congress and outside of it, set out a powerfully reasoned, breathtaking plan for reform, pinning their hopes on Congress intervening to "correct various flawed judicial rules . . . that inappropriately circumscribe antitrust enforcement."²²⁴ They urge Congress to "clarify that the antitrust laws protect potential and nascent competition," enact "legislation allowing plaintiffs to prevail . . . by showing that the challenged conduct increases the risk of competitive harm[—rather than] showing that competitive harm is more likely than not[—or] specify presumptions of competitive harm[,]""lower[] the threshold for pre-merger notifications to help address insufficient deterrence of anticompetitive acquisitions[—] particularly by dominant firms acquiring nascent rivals[—] and creat[e] a specialized trial court for antitrust litigation."²²⁵ However, they devote relatively little attention to how they might successfully achieve their proposals.²²⁶ Many assume their legislative proposals can be rapidly introduced and that agencies share the same vision for fundamental change.²²⁷ They would be wrong.

1. No Help from Congress

Senator Amy Klobuchar's bill, the Competition and Antitrust Law Enforcement Reform Act, could be "the largest overhaul to [U.S.] antitrust regulation in at least [forty-five] years if it [becomes] law."²²⁸

222. See *id.* at 6–7; Cristiano Lima, *GOP Lawmaker: Democrats' Tech Proposals Will Include 'Non-Starters for Conservatives'*, POLITICO (Oct. 5, 2020, 4:40 PM), <https://www.politico.com/news/2020/10/05/gop-democrats-tech-antitrust-proposals-426528>.

223. *Taming Big Tech: America and Europe Clamp down on Big Tech*, ECONOMIST (Dec. 19, 2020), <https://www.economist.com/leaders/2020/12/19/america-and-europe-clamp-down-on-big-tech>.

224. See Baker et al., *supra* note 106, at 14. "[Congress] can and should revise the antitrust laws so they are no longer inconsistent with modern economic thinking, correct the skewed error cost balance in existing judicial interpretations, and ensure that our antitrust enforcement institutions are properly funded and designed to succeed." *Id.* at 13.

225. *Id.*

226. Jones & Kovacic, *supra* note 107, at 238.

227. *Id.*

228. Kate Cox, *Klobuchar Targets Big Tech with Biggest Antitrust Overhaul in 45 Years*, ARS TECHNICA (Feb. 5, 2021, 4:58 PM), <https://arstechnica.com/tech-policy/2021/02/klobuchar-targets-big-tech-with-biggest-antitrust-overhaul-in-45->

The bill proposes significantly expanded resources for the Federal Trade Commission and the Antitrust Division at the Department of Justice to allow both to pursue review of more mergers more aggressively.²²⁹ “More importantly, . . . the proposed law would invoke modern legal theories to update antitrust law for the way companies . . . compete . . . in the 21st century.”²³⁰ However, the likelihood that the bill will result in a lasting change in antitrust enforcement is close to zero.

First, while Republicans agree that antitrust agencies need additional resources and tools to provide proper oversight of tech giants, they disagree on what to target and how to remedy the situation.²³¹ Second, even if Congress is willing to act, “powerful business interests will . . . stoutly oppose . . . legislation to expand the reach of the antitrust laws or to create a new digital regulator.”²³² Third, even if Congress were successful in the face of business opposition, “[l]egislative relief from existing jurisprudential structures might take years to accomplish”²³³ and may still be relatively complex and difficult to prosecute. However, there is a fourth and yet more compelling reason to quell overoptimism on the bill’s prospects for instituting meaningful change.

In the face of brazen judicial activism, Congress has always been free to restrain the courts, but it has not done so in antitrust law, unlike other areas of the law.²³⁴ Instead, as seen in Part I.A., Congress acquiesced as judges applied antitrust law to pursue its *détente* between an aspirational attachment to smallness over bigness and corporate America’s demands.²³⁵ True, in antitrust law’s early days,

years; see Press Release, U.S. Senator Amy Klobuchar, Senator Klobuchar Introduces Sweeping Bill to Promote Competition and Improve Antitrust Enforcement (Feb. 4, 2021), <https://www.klobuchar.senate.gov/public/index.cfm/2021/2/senator-klobuchar-introduces-sweeping-bill-to-promote-competition-and-improve-antitrust-enforcement>.

229. See *id.*

230. Cox, *supra* note 228.

231. See Lima, *supra* note 222 (“The remarks signal areas of both significant agreement and disagreement between congressional Democrats and Republicans on how to ratchet up scrutiny of the world’s biggest tech companies.”); see also *id.* (describing Republican opposition over arbitration clauses, class action lawsuits, and structural breakups).

232. Jones & Kovacic, *supra* note 107, at 246.

233. *Id.* (quoting William E. Kovacic, “*Competition Policy in Its Broadest Sense*”; Michael Pertschuk’s *Chairmanship of the Federal Trade Commission 1977-1981*, 60 WM. & MARY L. REV. 1269, 1332 (2019)).

234. See, e.g., Trademark Dilution Revision Act of 2006, Pub. L. No. 109-312, § 3(c), 120 Stat. 1730, 1732 (2006) (overturning the U.S. Supreme Court decision in *Moseley v. V Secret Trademark Catalogue, Inc.*, 537 U.S. 418 (2003), which specified a need to show actual trademark dilution rather than the likelihood of dilution).

235. See, e.g., Farber & McDonnell, *supra* note 14, at 657 (identifying an intellectually diverse set of scholars who “view the antitrust laws, not as statutory

Congress attempted to fill gaps in the Sherman Act, particularly concerning mergers, exclusive dealing, and tying. Adverse public reaction to the rule of reason prompted Congress to pass the Clayton Act and the Federal Trade Commission Act in 1914.²³⁶ In 1936, Congress enacted the Robinson-Patman Price Discrimination Act over concern that chain grocery stores squeezed out smaller, family-run stores.²³⁷ Courts, however, neutered any lasting legislative impact by simply folding them within the established Sherman Act analysis.²³⁸

According to Crane, “[t]hrough a chronic cycle of legislative enactment, judicial disregard, and implicit legislative acquiescence, Congress and the courts have constituted the common law system that judges and scholars across the political spectrum now consider normalized and perhaps even inevitable.”²³⁹ He concludes that “[s]o long as the judicial decisions achieve results that strike a politically acceptable outcome between the aspirational and pragmatic impulses, Congress is content to leave the judicial and enforcement decisions alone.”²⁴⁰ So whatever aspirations Congress has for reigning in Big Tech and others will, sooner or later, be pared down by the judiciary.

Of course, President Biden could gradually change the federal courts’ philosophy by appointing judges sympathetic to reform.²⁴¹

mandates, but as delegations of lawmaking power to the courts”); Khan, *supra* note 24, at 1678 (“Given that the foundational antitrust statutes are written in sweeping language, scholars and judges have long argued that law-makers who passed the Sherman Act delegated to the judiciary broad powers to craft the substantive rules of antitrust law.”).

236. See Jonathan M. Jacobson, *Exclusive Dealing, “Foreclosure,” and Consumer Harm*, 70 ANTITRUST L.J. 311, 317 (2002) (“One of the underlying concerns expressed by proponents of the new legislation was that the ‘rule of reason’ . . . would authorize even the most harmful competitive practices . . .”). The Clayton Act prohibits price discrimination, exclusive-dealing arrangements, and mergers before consummation, if their effect would substantially lessen competition. 15 U.S.C. §§ 13–14, 18 (2018). The FTC Act created a special federal agency possessing economic expertise that Congress and the federal judiciary lacked. See BEN VAN ROMPUY, *ECONOMIC EFFICIENCY: THE SOLE CONCERN OF MODERN ANTITRUST POLICY?* § 2.02(B)(2) (2012). The FTC Act permitted the FTC to act against “[u]nfair methods of competition” and “unfair or deceptive acts or practices in or affecting commerce.” 15 U.S.C. § 45 (2018).

237. See 15 U.S.C. § 13 (2018); Karen Kim, *Amazon-Induced Price Discrimination Under the Robinson-Patman Act*, 121 COLUM. L. REV. F. 160, 160, 162 (2021).

238. See, e.g., *Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 221–24 (1993) (“[P]rimary-line competitive injury under the Robinson-Patman Act is of the same general character as the injury inflicted by predatory pricing schemes actionable under § 2 of the Sherman Act.”); see also D. Daniel Sokol, *Analyzing Robinson-Patman*, 83 GEO. WASH. L. REV. 2064, 2077–84 (2015) (discussing judicial enforcement of the Robinson-Patman Act).

239. Crane, *supra* note 67, at 38.

240. *Id.* at 33.

241. But see William E. Kovacic, *The Antitrust Paradox Revisited: Robert Bork and the Transformation of Modern Antitrust Policy*, 36 WAYNE L. REV. 1413, 1468–69

Meaningful change will lie in convincing the judiciary that robust antitrust can be consistent with economic benefits.²⁴² To change case law, antitrust plaintiffs will need to refine doctrine through softening or reversing current case law. Without a more robust way to arbitrate between competing narratives, that task will not be easy. As Crane notes, “[g]iven over a century’s tradition of interpreting antitrust statutes as invitations to continue a common law process whatever else suggested by the statute’s text, it is difficult to see how simply accumulating stern new language in new texts would lead to a different result.”²⁴³

In sum, passing new legislation is unlikely, and adopting it through judicial interpretation is slow. Congress would not likely delegate more direct control over economic activities to a new antitrust agency. Regulatory rulemaking is an alternative, but agencies must be willing to launch themselves into lengthy investigations. The agencies must prosecute enough complex cases against well-resourced and powerful companies in cases heard by a judiciary that is populated with many regulation Chicagoan skeptics who will subject new rules or related measures to demanding scrutiny.²⁴⁴ There seems no way out of Chicago’s rule of reason. Yet, seemingly against all odds, Americans of all stripes roused antitrust against tech giants posed to smother competition, privacy, and their democracy.²⁴⁵ A handful of scholars have carried their fight into the normative debate on antitrust ideology. The banner they march under is as old as the Sherman Act itself. The courts had abandoned their ideology once before and will unlikely embrace it again.

2. A Neo-Brandeisian Resurgence

In the decades since Chicago’s rule began, the debate focused on economic tools exemplified by Post-Chicago theories such as raising

(1990) (noting presidents typically only appoint approximately twenty to 25% of the federal bench over a four-year period).

242. See *id.* at 1450–51.

243. Crane, *supra* note 67, at 36–37.

244. See Lao, *supra* note 85, at 665 (“In fact, a case can be made that, today, the risk of false *negatives* is likely higher than the risk of false positives.”).

245. See Associated Press, *Biden Seen Reining in Mergers and Cracking Down on Big Tech*, TAMPA BAY TIMES (Nov. 12, 2020), <https://www.tampabay.com/news/2020/11/11/biden-seen-reining-in-mergers-and-cracking-down-on-big-tech/> (“The Google case, the biggest monopoly action against a company in the U.S. in two decades, marked a sharp reversal in antitrust enforcement.”). Progressives see antitrust panacea to concentrated industries responsible for income inequality, declining business investment, anti-democratic speech, violent extremism and racism, and stagnant wages. *Id.* In contrast, Conservatives seek to use it as a weapon to cleanse social media of anti-conservative biases. See Lima, *supra* note 222.

rivals' costs but generally adhering to Chicago's platform of economic-focused discourse.²⁴⁶ Together, with the rise of Big Tech, came the question of antitrust's goals and institutional structure,²⁴⁷ as Chicago's failure created an opening for Neo-Brandeisians to resurrect a vision of antitrust rooted in populist antimonopoly values.²⁴⁸

Thus, Lina Khan's *Yale Law Journal* 2017 student essay argued that Amazon acted anticompetitively and could do so because permissive antitrust law allowed the consolidation of one industry after another, giving a disproportionately small number of companies disproportionately great power.²⁴⁹ In her scholarship, Khan argues that "[s]ince Chicago introduced a new normative conception of antitrust, challenging its dominance will require offering an alternative normative vision of what the law stands for and how it can be operationalized."²⁵⁰ She also points to "a conflict of interest that platforms can exploit to further entrench their dominance, thwart competition, and stifle innovation."²⁵¹ As examples, Khan cites "Spotify's effort to reach users through Apple's iPhone while Apple sought to promote [its own] Apple Music,"²⁵² as well as Google's squelching of Yelp while seeking to build out its competitor offerings.²⁵³

In the same vein, Professor Tim Wu warns that the concentration of wealth and economic power in a small number of large firms is dangerous to the extent that it represents a "profound threat to democracy itself."²⁵⁴ Unchecked, this would lead to "widespread popular anger and demands for something new and different" that

246. See discussion *supra* Part I.A.4.

247. See First, *supra* note 4, at 326 ("[T]he current debate has shifted once again to a serious discussion of goals and away from methods.").

248. See Lina Khan, *The New Brandeis Movement: America's Antimonopoly Debate*, 9 J. EUR. COMPETITION L. & PRAC. 131, 131 (2018); see also Andrew I. Gavil & Steven C. Salop, *Probability, Presumptions and Evidentiary Burdens in Antitrust Analysis: Revitalizing the Rule of Reason for Exclusionary Conduct*, 168 U. PA. L. REV. 2107, 2125 (2020) ("While the Chicago-School's analysis provided useful criticisms of 1960s legal standards, they have gone too far in various ways.").

249. See Lina M. Khan, *Amazon's Antitrust Paradox*, 126 YALE L.J. 710, 710 (2017).

250. Khan, *supra* note 24, at 1676; see also *id.* at 1675 (calling "purported benefits of a price theory-based and consumer welfare-oriented antitrust . . . overstated").

251. Lina M. Khan, *The Separation of Platforms and Commerce*, 119 COLUM. L. REV. 973, 973 (2019).

252. *Id.* at 977 (narrating Apple's blocking of Spotify, the music streaming application, from the App Store).

253. *Id.* (reporting that European and Indian competition authorities accused Google of "rank[ing] its own services higher than those offered by rivals" to suppress rival visibility on Google search results).

254. See WU, *supra* note 52, at 15.

leads to “a return to the politics of outrage and of violence.”²⁵⁵ Scholarship like Khan’s and Wu’s galvanized those seeking a theory to rein in Big Tech.²⁵⁶ They find their inspiration in Justice Brandeis’ anti-bigness sentiment in his famous phrase “the Curse of Bigness,”²⁵⁷ juxtaposing two fundamental American impulses—a romantic notion of productive smallness and a concern that its fetishization would deny industry the scale and scope to advance industry for the national good.²⁵⁸

Writing for the Supreme Court in *Alcoa*, Justice Brandeis expressed a preference for smaller rivals who could more quickly detect and take advantage of opportunities for efficiencies and shifts in consumer needs than large firms.²⁵⁹ In the face of judicial activism, *Alcoa* sought a textualist return to Congress’ intention to favor “a system of small producers.”²⁶⁰ Brandeisian antitrust, in turn, finds parallels in Jeffersonian republican agrarianism and Andrew Jackson’s anti-bank populism,²⁶¹ as well as the Sherman Act’s legislative history that seemed to equate the power of the trusts with the monarchical power that King George III exerted on the American colonies.²⁶²

Neo-Brandeisians argue that the extraordinary latitude courts have in crafting antitrust policy led both to its reorientation around Chicagoo norms and its inertia to change despite its cherished

255. *Id.* at 22.

256. See, e.g., Leon B. Greenfield et al., *Antitrust Populism and the Consumer Welfare Standard: What Are We Actually Debating?*, 83 ANTITRUST L.J. 393, 393 (2020) (collecting sources on the “debate over the proper role of antitrust”).

257. *United States v. Columbia Steel Co.*, 334 U.S. 495, 535 (1948); see, e.g., ALPHEUS THOMAS MASON, *BRANDEIS: A FREE MAN’S LIFE* 181 (1946); THOMAS K. MCCRAW, *PROPHETS OF REGULATION* 108 (1984) (“Early in his career, Brandeis decided that big business could become big only through illegitimate means. By his frequent references to the ‘curse of bigness,’ he meant that bigness itself was the mark of Cain, a sign of prior sinning.”).

258. See Crane, *supra* note 67, at 35 (“Americans venerate small business almost religiously; the family entrepreneur is arguably more important as a cultural icon than as a backbone of the economy.”).

259. See *United States v. Aluminum Co. of Am.*, 148 F.2d 416, 427 (2d Cir. 1945) (“[C]ompetitors . . . will be quick to detect opportunities for saving and new shifts in production, and be eager to profit by them.”).

260. See *id.* (“[B]ecause of its indirect social or moral effect, . . . a system of small producers, each dependent for his success upon his own skill and character, [may be preferred] to one in which the great mass of those engaged must accept the direction of a few.”).

261. See K. Sabeel Rahman, *Democracy and Productivity: The Glass-Steagall Act and the Shifting Discourse of Financial Regulation*, 24 J. POLY HIST. 612, 619–20 (2012).

262. See 21 CONG. REC. 2457 (1890).

theories having been refuted by evidence and experience.²⁶³ Some point to efficiency-based doctrines callously displacing egalitarian aims that motivated the enactment of antitrust laws in the first place.²⁶⁴ Others blame the unexercised industrial organization economics theory haunting modern doctrine.²⁶⁵ Yet others reason that an enforcement timidity is rooted in the capture by potential prosecutorial targets of the federal enforcement agencies.²⁶⁶

For Neo-Brandeisians, the road forward is a way back to a better time when antitrust law protected our economy from concentrations of wealth and power rather than endangered both the economy and the political system. Neo-Brandeisian antitrust, while faithful to Congress' intent 130 years ago, would sweep aside the economic architecture that generations of scholars, jurists, and attorneys have labored to build and that Chicago had sought to correct. More fundamentally, Neo-Brandeisian antitrust could plunge the law into a level of indeterminacy worse than anything that has been seen so far.

3. Indeterminacy Once More

Antitrust intervention sometimes results in distributive consequences. More competition leads to lower prices, which distribute wealth more progressively by charging less to those who can least afford it.²⁶⁷ Beyond that, progressive policies have little to do with modern antitrust law and policy, argues Professor Thomas Nachbar, who criticizes Neo-Brandeisians like Wu for:

misdiagnos[ing] the ills of today's antitrust while failing to demonstrate either that his vision of antitrust is any more workable today than it was when it was rejected or, for that matter, that yesterday's antitrust still makes sense to solve so many problems

263. Khan, *supra* note 24, at 1678 (describing "Neo-Brandeisian efforts to both democratize antitrust and remedy its doctrinal deficiencies"); *see, e.g.*, Christopher R. Leslie, *Predatory Pricing and Recoupment*, 113 COLUM. L. REV. 1695, 1713–41 (2013) (describing how courts continue to misapply the recoupment requirement).

264. *See, e.g.*, Khan, *supra* note 251, at 718–19.

265. *See, e.g.*, BAKER, *supra* note 219, at 13.

266. *See, e.g.*, JONATHAN TEPPER & DENISE HEARN, *THE MYTH OF CAPITALISM: MONOPOLIES AND THE DEATH OF COMPETITION* 162–65 (2019). *See generally* THOMAS PHILIPPON, *THE GREAT REVERSAL: HOW AMERICA GAVE UP ON FREE MARKETS* 174–75 (2019) (discussing how lobbying can have "a very real impact on public policy").

267. *See* Oliver Blanchard, *The Economic Future of Europe*, 18 J. ECON. PERSPS. 3, 18 (2004).

for which we have other, modern regulatory solutions.²⁶⁸

Nachbar points out that even if there were universal agreement on what fairness requires, the law is not generally interested in fairness, preferring to prohibit certain forms of unfairness.²⁶⁹ Involving fairness as a mandate to prevent the unfair allocation of goods and services would target the optimization of fairness, including ways completely unrelated to markets, rather than for its ability to produce goods and services.²⁷⁰ As a practical matter, courts and agencies have too little information on distributional gains and losses to judge their impact between consumers' classes. And as unelected officials, they have no political mandate to make that call. Accordingly, Nachbar argues consumers are generally better off collecting information if platforms leverage the information to develop services and products consumers want.²⁷¹ Professor Harry First also warns against using antitrust to achieve multiple policy goals. First argues multiple goals not only "complicate[] analysis," but they make it difficult "to judge whether we would be better off if one goal were advanced but at the cost of another."²⁷²

The reasoning is compelling. We want markets to produce goods and services not just efficiently but fairly as well. At some level, we always shape markets based on views of fairness and intervene in regard to perceived market unfairness.²⁷³ So, although markets themselves are usually not concerned with fairness, we are always broadly concerned with "fair markets."²⁷⁴ The operational problem, however, is that "fairness" is a difficult goal to define.²⁷⁵

One response to our inability to prioritize goals is to constrict those goals, as Nachbar and First suggest.²⁷⁶ Another is to prioritize

268. Nachbar, *supra* note 53.

269. See Thomas B. Nachbar, *Algorithmic Fairness, Algorithmic Discrimination*, 48 FLA. ST. U. L. REV. 509, 523–25 (2021).

270. See *id.* at 525–26.

271. Nachbar, *supra* note 53, at 5 ("It may seem untoward, but that kind of untoward, elbow-knocking competition is the kind of conduct antitrust not only permits but encourages . . .").

272. First, *supra* note 4, at 323.

273. See Nachbar, *supra* note 269, at 525 (explaining that regimes regulating unfair competition "regulate negatively, prohibiting a specific set of acts deemed to be wrongful").

274. See *id.* at 523 ("The intuitive appeal of the concept of fairness is virtually irresistible for those providing their own proposals for guiding conduct.").

275. See *id.* at 523–24 (stating that there is an "absence of any universally, or even widely, held comprehensive understanding of 'fairness'").

276. See First, *supra* note 4, at 323 (stating that having multiple goals calls for multiple approaches, which complicates analysis); Nachbar, *supra* note 269, at 526

between goals more clearly. It is exactly where analogical precedent and AI might help identify which prioritizations we have made over time. Raw data and computing power allow us to judge between competing goals rather than abandoning them as Chicagoans have done in response to the conflict because, in all fairness, they could do no better at the time.²⁷⁷

We always muddle through when theory and empirical information are inadequate—we just do so poorly. As Judge Easterbrook put it, judicial “[w]isdom lags far behind the market.”²⁷⁸ He warned, “[o]nly someone with a very detailed knowledge of the market process, as well as the time and data needed for evaluation, would be able to answer that question. Sometimes no one can answer it.”²⁷⁹ Accordingly, antitrust enforcement must be held in abeyance until “doubts” about “the ability of courts to make things better even with the best data . . . have been overcome.”²⁸⁰ For the first time in antitrust law’s turbulent history, things could get much easier.

II. THE ANTITRUST ALGORITHM

There are two dominant streams of the debate in antitrust law. In the first, scholars debate antitrust’s response to businesses using AI to stabilize tacit collusion.²⁸¹ In the second, scholars debate antitrust’s normative theories, as seen in Part I.²⁸² I meld the two streams by employing AI as a positive forensic and predictive tool, explaining how government agencies and academia can be testbeds for antitrust’s AI revolution.

A. Bridging Two Streams of the Debate

Antitrust law generally allows tacit or “follow the leader” type behavior among firms, so they are not unduly penalized for independently matching their rivals’ prices.²⁸³ To succeed, plaintiffs

(suggesting that once a threshold level of fairness is achieved, the focus shifts from fairness to “maximizing the goals of the systems on which fairness operates”).

277. See generally NAT’L SEC. COMM’N ON ARTIFICIAL INTELLIGENCE, FINAL REPORT 2 (2021), <https://www.nscai.gov/wp-content/uploads/2021/03/Full-Report-Digital-1.pdf> (discussing how competition can lead to quests for data, computing power, and AI breakthroughs).

278. See Easterbrook, *supra* note 97, at 5.

279. *Id.*

280. Frank H. Easterbrook, *Workable Antitrust Policy*, 84 MICH. L. REV. 1696, 1701 (1986).

281. See, e.g., Ariel Ezrachi & Maurice E. Stucke, *Sustainable and Unchallenged Algorithmic Tacit Collusion*, 17 NW. J. TECH. & INTELL. PROP. 217, 225 (2020).

282. See discussion *supra* Part I.

283. See, e.g., *Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S.

must show additional circumstances to infer a conspiracy such as common intent among rivals, acting against their apparent economic self-interests, or a high communication level between them, which generates the same dangerous adhesion as price-fixing.²⁸⁴ It is widely accepted AI may facilitate and stabilize tacit collusion in markets where conspiracy would previously have been unsustainable.²⁸⁵ Pricing algorithms increase market transparency, simplify communication between market players, and detect deviations—all almost instantaneously.²⁸⁶

The German Monopoly Commission has proposed a novel suggestion—if there is a likelihood of anticompetitive algorithmic price alignment in the market, the companies have to show AI did not contribute to the alignment.²⁸⁷ In the United States, Senator Klobuchar has pushed for a bill that would similarly shift the burden on firms in a dominant market position to demonstrate that a merger would not “create an appreciable risk of materially lessening competition,” in addition to not creating a monopoly or monopsony.²⁸⁸ Rather than focus on the nefarious potential of AI role, this Article turns foe to friend.

The second stream of the debate swirls around different ideological threads that pull antitrust in different directions. However, might it not be argued that antitrust itself is an algorithm? In this sense, the Chicago, post-Chicago, and Neo-Brandeisian schools are simply different operating systems judges use to reach their

209, 227 (1993) (describing “the process, not in itself unlawful, by which firms in a concentrated market might in effect share monopoly power, setting their prices at a profit-maximizing, supracompetitive level by recognizing their shared economic interests and their interdependence with respect to price and output decisions” and subsequently, unilaterally set their prices above the competitive level).

284. *In re Publ'n Paper Antitrust Litig.*, 690 F.3d 51, 62 (2d Cir. 2012).

285. See ANIA THIEMANN & PEDRO GONZAGA, SECRETARIAT, ORG. FOR ECON. CO-OPERATION & DEV., BACKGROUND NOTE AT THE 126TH MEETING OF THE COMPETITION COMMITTEE, BIG DATA: BRINGING COMPETITION POLICY TO THE DIGITAL ERA (Nov. 29–30, 2016), [https://one.oecd.org/document/DAF/COMP\(2016\)14/en/pdf](https://one.oecd.org/document/DAF/COMP(2016)14/en/pdf) [<https://perma.cc/KL28-QS5D>].

286. See Ariel Ezrachi & Maurice E. Stucke, *Artificial Intelligence & Collusion: When Computers Inhibit Competition*, 2017 U. ILL. L. REV. 1775, 1782–84 (2017).

287. See Antonina Yaholnyk & Anastasiia Zeleniuk, *Antitrust Liability for Tacit Algorithmic Price Alignment in the EU and the US*, LEXOLOGY (Sept. 9, 2020), https://www.lexology.com/library/detail.aspx?g=3b6a02ab-4b16-444a-8b38-b6a5e88c8962&utm_source=Lexology+Daily+Newsfeed&utm_medium=H%E2%80%A6 (arguing that it is “only a question of time” before European authorities will formalize this burden-shifting in algorithmic pricing cases more broadly to include cases involving tech companies).

288. Kate Cox, *Klobuchar Targets Big Tech with Biggest Antitrust Overhaul in 45 Years*, ARS TECHNICA (Feb. 5, 2021), <https://arstechnica.com/tech-policy/2021/02/klobuchar-targets-big-tech-with-biggest-antitrust-overhaul-in-45-years/>.

desired outcomes as they apply the rule of reason.²⁸⁹ Consider, for instance, how Chicago gives priority to property rights.²⁹⁰ Judges shy away from mandating access to a dominant intellectual property owner's technology.²⁹¹ Chicago's code, therefore, instructs the algorithm that antitrust intervention would reduce its effectiveness.²⁹²

Recognizing the operating system begs the question of whether its market prescription is, in fact, desirous.²⁹³ Some say the answer is "no." For instance, Woodcock argues Chicago's consumer welfare standard is an unworkable compromise, forcing courts to optimize resource allocation in a way consistent with Chicago's concerns about judicial error.²⁹⁴ According to him, this compromise failed because "courts have not so far been able to reduce the consumer welfare

289. Woodcock, *supra* note 55, at 47 ("The Chicago School . . . suggests that there is a difference . . . between regulated markets . . . and free markets, understood to consist of laissez faire plus property rights . . . each is merely a different kind of regulation of that preexisting thing called markets, each an attempt to make of markets a better master algorithm."); *id.* at 59 ("Antitrust, like all applied economics, is ultimately a branch of artificial intelligence, writ large, code running on society understood as a computer, and the best code learns.").

290. *Id.* at 48 ("The question posed by Chicago as whether to regulate is really the question whether the machine learning algorithm that is markets-plus-property-rights can be improved, and if so how."); *see also id.* at 47-48 (noting the algorithm should "incorporate property rights, along with legal rules requiring that firms maximize profits and an ideology that encourages individuals to act to maximize their own happiness").

291. *Verizon Comm'ns Inc. v. L. Offs. of Curtis V. Trinko*, 540 U.S. 398, 407-08 (2004) ("Compelling . . . firms to share the source of their advantage is in some tension with the underlying purpose of antitrust law, since it may lessen the incentive for the monopolist, the rival, or both to invest in those economically beneficial facilities."). Judge Easterbrook has made a similar point:

Antitrust is an imperfect tool for the regulation of competition. Imperfect because we rarely know the right amount of competition there should be, because neither judges nor juries are particularly good at handling complex economic arguments, and because many plaintiffs are interested in restraining rather than promoting competition. . . . Something must be done. That 'something' is to replace the existing method of antitrust analysis with a series of simple filters. . . . Each filter errs, if at all, on the side of permitting questionable practices.

Easterbrook, *supra* note 97, at 39-4.

292. Woodcock, *supra* note 55, at 52 ("That is the entire substance of the Chicago School's error cost skepticism: the notion that antitrust is unable to distinguish good from bad conduct.").

293. *Id.* at 54 (stating "one can turn an equally skeptical eye upon all parts of the algorithm, including the regime of property rights").

294. *See id.* at 55.

standard to a coherent rule—that is, to an algorithm, rather than an aspiration.”²⁹⁵ Building on Woodcock’s observation, I discuss the promise of algorithmic antitrust, algorithmic antitrust mechanics, and how we can use algorithmic antitrust to formulate better antitrust rules.

1. The Promise of Algorithmic Antitrust

AI patents give us a clue what algorithms can do. Over 75% focus on natural language processing, with the rest covering deep learning and reinforcement learning.²⁹⁶ Machine vision, speech and handwriting recognition all use deep learning algorithms.²⁹⁷ Artificial neural networks represent an example of these algorithms, inspired by the human brain’s neural networks.²⁹⁸ Neuromorphic computing increases the speed of calculations and training speed of neural networks.²⁹⁹ This speed means predictive analytics can handle large and constantly updated data streams to construct models of outcomes from historical data from interactions between inventors and patent examiners.³⁰⁰

Work by Professor Tabrez Ebrahim indicates that AI’s predictive ability is already “better than humans, even the most sophisticated and expert lawyers.”³⁰¹ In short, AI models can make decisions and assist humans in making them.³⁰² The progress of these deep learning techniques brings abstract and value-based decision-making by algorithms within grasp. We use AI in so many ways that applying it in antitrust analysis may sound arcane or prosaic. In fact, it is revolutionary.

295. *Id.*

296. Brian S. Haney, *AI Patents: A Data Driven Approach*, 19 CHI. KENT J. INTELL. PROP. 407, 414 (2020) (reporting 1,858 patents in natural language processing, 354 patents in deep learning, 234 in reinforcement learning, and 13 in deep reinforcement learning).

297. See JOHN D. KELLEHER & BRENDEN TIERNEY, DATA SCIENCE 97 (2018).

298. See, e.g., IAN GOODFELLOW ET AL., DEEP LEARNING 13 (2016).

299. Stefan Pircalabu, *The Future of Artificial Intelligence — Neuromorphic Computing*, MEDIUM (May 30, 2020), <https://towardsdatascience.com/the-future-of-artificial-intelligence-neuromorphic-computing-34bcc5cc35a>.

300. Tabrez Y. Ebrahim, *Automation & Predictive Analytics in Patent Prosecution: USPTO Implications & Policy*, 35 GA. ST. U. L. REV. 1185, 1205 (2019). (“Patent-prosecution big data,’ which includes historical patent-prosecution data and continuously updated new patent-prosecution data, can outperform traditional statistical techniques in predicting outcomes concerning patent examiners’ examination and allowance characteristics.”).

301. *Id.* at 1203.

302. Michael Simon, et. al., *Lola v. Skadden and the Automation of the Legal Profession*, 20 YALE J.L. & TECH. 234, 254 (2018).

First, AI makes antitrust suits faster and cheaper. Current rules make bringing an antitrust suit highly costly and protracted.³⁰³ The Supreme Court described antitrust litigation as “interminable”³⁰⁴ with an “inevitably costly and protracted discovery phase,”³⁰⁵ yielding an antitrust system that Professor Maurice Stucke judged as “hopelessly beyond effective judicial supervision.”³⁰⁶ Once the antitrust matter gets to trial, its plod may fail to keep pace with the market.³⁰⁷ It can take a decade or more to bring a case to judgment.³⁰⁸ Lengthy, costly litigation may paralyze government-enforcement efforts in policing anticompetitive conduct.³⁰⁹

AI-enabled videoconferencing on Zoom has revolutionized workplace productivity to the pandemic in ways our forebearers during the Spanish Flu could only dream about,³¹⁰ and Wall Street firms leverage on AI to pick optimal trading strategies because market conditions are indeterminate, and brokers, like judges, need help to collate and make sense of the data.³¹¹ Similarly, AI gives courts an unprecedented capability to scour case reports to assess how past courts weighed competitive effects and stress-test theories of harm against real-world data using less time and expense than normally years-long litigation would require.³¹² AI can significantly reduce the time and effort needed to analyze a case, and courts can apply legal principles involving consistently, even when the facts are

303. See, e.g., KOLASKY ET AL., *supra* note 30, at 66.

304. *Verizon Comm'ns Inc. v. Law Offices of Curtis V. Trinko*, 540 U.S. 398, 414 (2004).

305. *Bell Atlantic Corp. v. Twombly*, 550 U.S. 544, 558 (2007) (quoting *Asahi Glass Co. v. Pentech Pharms., Inc.*, 289 F. Supp. 2d 986, 995 (N.D. Ill. 2003)).

306. Maurice E. Stucke, *Does the Rule of Reason Violate the Rule of Law?*, 42 U.C. DAVIS L. REV. 1375, 1378 (2009).

307. See, e.g., Kevin Caves & Hal Singer, *When the Econometrician Shrugged: Identifying and Plugging Gaps in the Consumer-Welfare Standard*, 26 GEO. MASON L. REV. 395, 424 (2018) (“[I]t is unlikely that the slow pace of antitrust enforcement could keep up with the fast pace of high-tech markets.”).

308. See, e.g., Jonathan M. Jacobson, *Tackling the Time and Cost of Antitrust Litigation*, 32 ANTITRUST 3 (2017) (describing a case where the final remedy was issued over twenty years after the underlying conduct had taken place, impeding the efficacy of the remedy).

309. See, e.g., KOLASKY ET AL., *supra* note 31, at 5.

310. See Kyle Wiggers, *Zoom Rolls Out AI-powered Transcripts, Note-Taking Features, and More*, VENTUREBEAT (Oct. 15, 2019, 9:00 A.M.), <https://venturebeat.com/2019/10/15/zoom-rolls-out-ai-powered-transcripts-note-taking-features-and-more/>.

311. Olga Kane, *How Hedge Funds Use Machine Learning*, MEDIUM (June 17, 2020), <https://medium.com/@arkanealpha/stat-arb-hedge-funds-powered-by-machine-learning-18331c523aa7>.

312. See *infra* Part II.A.2.

idiosyncratic.³¹³

Second, there is a delegation of the judicial function to experts. The key challenge in antitrust adjudication is to determine when a competitive restraint is on balance harmful.³¹⁴ Determining whether something is anticompetitive involves a level of economic analysis generalist judges routinely lack.³¹⁵ Judges compensate by relying on third-party experts and their heuristics.³¹⁶ Indeed, Professors Michael Baye and Joshua Wright disturbingly report that generalist judges fail to analyze and assess expert evidence in antitrust cases independently.³¹⁷

Instead, these judges “delegate both factfinding and rulemaking to courtroom economists,” giving outsized influence to extra-judicial arbiters. When that happens, Professor Rebecca Haw's work indicates the lock-step adherence becomes “not just inevitable but often dispositive” as to the outcome.³¹⁸ With this result, judges mimic administrative agencies who solicit and review comments as part of their rulemaking efforts but do so without a similar level of expertise, time for consideration and experimentation, procedural safeguards, and informational benefits.³¹⁹ Unsurprisingly the current system incentivizes defendants to splurge on experts, with some experts

313. For an example of a type of law that would lend itself to AI analysis, consider the following from author Pamela Samuelson regarding fair use law:

[F]air use law is both more coherent and more predictable than many commentators have perceived once one recognizes that fair use cases tend to fall into common patterns, or what this Article will call policy-relevant clusters. The policies underlying modern fair use law include promoting freedom of speech and of expression, the ongoing progress of authorship, learning, access to information, truth telling or truth seeking, competition, technological innovation, and privacy and autonomy interests of users.

Pamela Samuelson, *Unbundling Fair Uses*, 77 *FORDHAM L. REV.* 2537, 2541–42 (2009).

314. Woodcock, *supra* note 55, at 51 (describing the challenge as knowing when it “disrupts the consumer-preference-signaling process at the heart of the algorithm”).

315. Michael R. Baye & Joshua D. Wright, *Is Antitrust Too Complicated for Generalist Judges-The Impact of Economic Complexity and Judicial Training on Appeals*, 54 *J.L. & ECON.* 1, 3 (2011).

316. See generally Lim, *supra* note 88.

317. Baye & Wright, *supra* note 315, at 2.

318. Rebecca Haw, *Adversarial Economics in Antitrust Litigation: Losing Academic Consensus in the Battle of the Experts*, 106 *NW. U. L. REV.* 1261, 1263 (2012); see also *id.* at 1261 (arguing that paid expert testimony now is often “the ‘whole game’ in an antitrust dispute.”).

319. See Rebecca Haw, *Amicus Briefs and the Sherman Act: Why Antitrust Needs a New Deal*, 89 *TEX. L. REV.* 1247, 1248–49, 1259 (2011).

earning more than senior partners at major law firms.³²⁰ In this arms race, public enforcers fork out between ten and fifteen million dollars on expert services each year³²¹ and place the government and consumers at a significant disadvantage in their attempt to arrest problematic behavior.³²²

The benefits of algorithmic antitrust go beyond the courts. Like judges, the FTC, Justice Department, and state attorneys-general will need to confront important questions about algorithmic design and how humans and machines interface in deciding outcomes. The Justice Department emphasized the need to understand the potential of AI in the field of antitrust.³²³ AI can improve the quality of antitrust agency decisions, unleash administrative data's power, and reduce the cost of core governance functions, making government performance more efficient and effective.

In 2020, the Administrative Conference of the United States (ACUS) published a report by a team of researchers at Stanford University and New York University that included lawyers, law students, computer scientists, and social scientists.³²⁴ The ACUS Report revealed that over 140 federal departments, agencies, and sub-agencies use AI.³²⁵ It noted the U.S. government's AI toolkit is diverse

320. Jesse Eisinger & Justin Elliott, *These Professors Make More Than a Thousand Bucks an Hour Peddling Mega-Mergers*, PROPUBLICA (Nov. 16, 2016), <https://www.propublica.org/article/these-professors-make-more-than-thousand-bucks-hour-peddling-mega-mergers> [<https://perma.cc/4DBF-4KGM>].

321. See, e.g., FED. TRADE COMM'N, OFFICE OF INSPECTOR GENERAL, AUDIT OF FEDERAL TRADE COMMISSION EXPERT WITNESS SERVICES 3 (Nov. 14, 2019), https://www.ftc.gov/system/files/documents/reports/final-report-audit-expert-witness-services/final_ftc_oig_report_on_expert_witnesses-redacted_11-14-19.pdf [<https://perma.cc/UAS8A-2FUS>] ("During FY 2015 and FY 2016, [the Bureau of Competition] obligated an average \$9.3 million on expert services and this spending continues to increase. In FY 2017, spending totaled over \$10.7 million and approached \$14.9 million in FY 2018.")

322. FED. TRADE COMM'N, OFFICE OF INSPECTOR GENERAL, TOP MANAGEMENT CHALLENGES FACING THE FEDERAL TRADE COMMISSION 3 (Sept. 27, 2019), https://www.ftc.gov/system/files/documents/reports/fy-2019-oig-report-ftcs-most-serious-management-challenges/fy_2019_ftc_management_challenges_oig_report.pdf [<https://perma.cc/23VE-ETX5>] (identifying soaring expert costs as one of the two top management challenges facing the Commission in 2019).

323. Makan Delrahim, Assistant Attorney Gen., Remarks at the Thirteenth Annual Conference on Innovation Economics (Aug. 27, 2020), <https://www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-thirteenth-annual-conference>.

324. DAVID FREEMAN ENGSTROM ET AL., GOVERNMENT BY ALGORITHM: ARTIFICIAL INTELLIGENCE IN FEDERAL ADMINISTRATIVE AGENCIES 6 (2020), <https://www.acus.gov/sites/default/files/documents/Government%20by%20Algorithm.pdf>.

325. *Id.*

and spans the federal administrative state. Nearly half of the surveyed agencies have experimented with AI, which has already noticeably improved operations.³²⁶ These include enforcing regulatory mandates centered on workplace safety, health care, environmental protection, and market efficiency; adjudicating government benefits and privileges, from disability benefits to intellectual property rights; monitoring and analyzing risks to public health and safety; and communicating with the public about its rights and obligations as welfare beneficiaries, taxpayers, asylum seekers, and business owners (see Figure 2, below).³²⁷

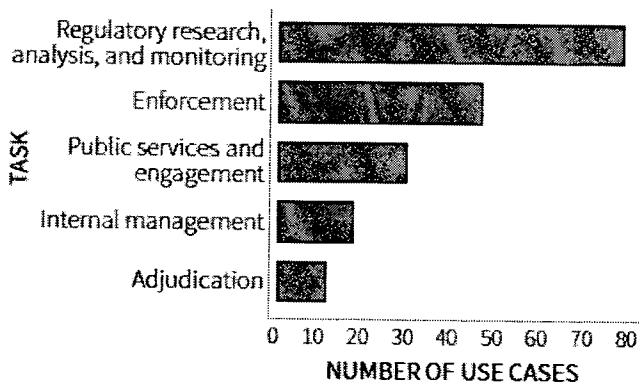


Figure 2: AI Use Cases by Governance Task³²⁸

However, the report notes that the government “still has a long way to go.”³²⁹ Only 10% of agencies cases use AI for adjudication, and only twelve percent of the government’s AI tools are deemed “sophisticated.”³³⁰ Simultaneously, the “black box” nature of more sophisticated AI will impede public officials’ ability to meet their legal obligations to explain how their decisions affect the public’s rights.³³¹ Moreover, for agencies to make responsible and smart use of AI,

326. *Id.*

327. *Id.*

328. *Id.* at 17.

329. *Id.* at 7.

330. *Id.* at 17–20 (“To illustrate the scale used we considered: (a) logistic regression using structured data to be of lower sophistication; (b) a random forest with attention to hyperparameter tuning to be of medium sophistication; and (c) use of deep learning to develop “concept questioning” of the patent examination manual to be of higher sophistication.”).

331. *Id.* at 7 (“A crucial question will be how to subject such tools to meaningful accountability and thus ensure their fidelity to legal norms of transparency, reasoning, and non-discrimination.”).

internal capacity building will be critical.³³² The same is true for the judiciary.

Parties, too, can benefit from employing AI in antitrust counseling. Like many other areas employing analogical reasoning, the rule of reason can benefit from pattern recognition that allows AI to predict how the law might apply to facts, using factors such as the length of the opinion, the number of citations and voting valence among judges.³³³ AI identifies relevant documents in discovery requests and goes beyond associations limited by keyword searches in case reports to produce a robust set of responsive legal options.³³⁴ The promise of algorithmic antitrust may sound good, but how would it work in practice?

2. The Mechanics of Algorithmic Antitrust

Scholars have long debated whether AI can replicate human legal reasoning.³³⁵ In his classic text *An Introduction to Legal Reasoning*, Edward Levi described how common law rules evolve.³³⁶ Judges begin by identifying factors that have legal salience to explaining case outcomes. Once those rules fail to yield sensible results, judges alter them accordingly.³³⁷ Legal reasoning rests on analogies, but this fact-specific method also makes developing coherence in case precedent an elusive task. For this reason, AI's ability to detect patterns in judicial opinions is of great interest to scholars.³³⁸

332. *Id.* ("While many agencies rely on private contractors to build out AI capacity, a majority of profiled use cases (53%) are the product of in-house efforts by agency technologists.")

333. Shivam Verma et al., *The Genealogy of Ideology: Predicting Agreement and Persuasive Memes in the U.S. Courts of Appeals*, in PROCEEDINGS OF THE ACM CONFERENCE ON AI AND THE LAW 2, 4 (2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2816707 (predicting vote alignment with accuracy of 73%).

334. See, e.g., Harry Surden, *Machine Learning and Law*, 89 WASH. L. REV. 87, 112-13 (2014).

335. See, e.g., Stephen M. McJohn, *Review of Artificial Legal Intelligence*, 12 HARV. J.L. & TECH. 241, 244 (1998) ("[T]here have been a number of projects that claim some progress toward automating legal reasoning. This naturally raises the question, to what extent do the programs actually model the task at issue, or, alternatively, succeed in producing results similar to human decisions?").

336. Edward H. Levi, *An Introduction to Legal Reasoning*, 15 U. CHI. L. REV. 501, 501-503 (1948).

337. *Id.* at 502; see also RONALD DWORKIN, *LAW'S EMPIRE* 400 (1986) (describing the concept of the common law gradually adjusting as it is challenged by case after case.).

338. See, e.g., *id.* at 151 ("For fair use - and legal scholarship generally - the prospect of detecting patterns is of great interest."); see also *id.* ("It could also bring yet another round of legal realism by showing what is going on underneath the hood of the legal engines of reasoning.").

Antitrust cases take facts and reduce them to abstractions to apply the legal parameters. In so doing, the algorithm can build on well-settled rules of case interpretation. For instance, Professor Arthur Goodhart identified the following to be salient features of cases:

- (1) All facts which the judge specifically states are immaterial must be considered immaterial.
- (2) All facts which the judge impliedly treats as immaterial must be considered immaterial.
- (3) All facts which the judge specifically states to be material must be considered material.
- (4) If the opinion does not distinguish between material and immaterial facts, then all the facts set forth must be considered material.
- (5) If in a case several opinions agree as to the result but differ as to the material facts, then the principle of the case is limited to fit the sum of all the facts held material by the various judges.
- (6) A conclusion based on a hypothetical fact is a dictum. By hypothetical fact, the existence of which has not been determined or accepted by the judge is meant.³³⁹

These six principles could form part of the training algorithm. In a pre-AI world, an army of legal scholars could conceivably employ comprehensively map antitrust jurisprudence. They would need to use a time-consuming manual empirical method called case-content analysis to code every case to determine the weight courts place of various legal and non-legal factors, identify which factors judges use to “stampede” others, trends across time, and relevant parametric factors that may typically escape conventional wisdom.³⁴⁰ These scholars would be joined by an army of economists to assess the economic theories and evidence, validating or invalidating them against current knowledge.

With AI, the algorithm can scour case law and match them against depositions and other preprocessed evidence to provide quicker and more consistent analyses.³⁴¹ Convolutional neural networks can abstract local features from examples, for example, by recognizing

339. Arthur L. Goodhart, *Determining the Ratio Decidendi of a Case*, 40 YALE L.J. 161, 182–83 (1930).

340. See, e.g., Barton Beebe, *An Empirical Study of U.S. Copyright Fair Use Opinions, 1978-2005*, 156 U. PA. L. REV. 549, 590–91 (2008).

341. See Haney, *supra* note 296. See generally *infra* II.A.I.

specific facts in opinions.³⁴² The algorithm would also account for interactions among indicators that escape even expert witnesses, contextualize and associate information with the familiar provide predictions based on untrained parameters.³⁴³ Unsupervised data mining algorithms can zero in on data clusters and probe those clusters to find other abstractions.³⁴⁴ For instance, principal component analysis can identify factors carrying the greatest weight in functions and zero in on the most important dimensions of datasets to show the stampeding factors.³⁴⁵

The algorithm could then compare the qualitative and quantitative presented in a given case to its markers as a first step. Cases presenting the same set of facts would reach the same outcome as precedential cases presenting the same set of markers. For instance, the AI might be trained to identify circumstances when a defendant's denial of essential technological inputs is incidental to activity that does not improve the incumbent's product but only serves only to degrade the quality or quantity of rivals' products. To do so, AI will need to specify the weight of factors not expressly entailed by rules or precedents. Once algorithms produce their recommendation, judges accept or reject the AI's recommendation, similar to how Amazon consumers choose to make another purchase based on Amazon's recommendations of their earlier purchases and browsing history.

Of courses, data scientists would need to account for creases in the data. Consider how the algorithm should treat cases from courts at different levels of the judicial hierarchy. *Stare decisis* tells us Supreme Court cases take precedence over courts of appeals, which in turn takes precedence over cases from the district court. Empirical legal studies, however, routinely ignore the weight *stare decisis* endows in coding datasets.³⁴⁶ It matters little if the Supreme Court or a district court looked at the rule of reason in excluding dealing arrangements if the variable of interest, the relevance of market

342. SEAN GERRISH, *HOW SMART MACHINES THINK* 135 (2018) ("This pattern - convolutional layers followed by fully connected layers - turns out to be very common in networks used for image recognition.").

343. Similarly, AI-based support vector machines (SVMs) can find relationships between sets of antitrust cases while handling outlier or mislabeled cases, allowing SVM to crunch abrogated case law. *See e.g.*, AURÉLIEN GÉRON, *HANDS-ON MACHINE LEARNING WITH SCIKIT-LEARN & TENSORFLOW* 145-67 (Nicole Tache et al. eds., 1st ed. 2017).

344. PEDRO DOMINGOS, *THE MASTER ALGORITHM* 210 (2015).

345. *Id.* at 217 (discussing Isomap, "[o]ne of the most popular algorithms for nonlinear dimensionality reduction").

346. *See, e.g.*, Daryl Lim, *Saving Substantial Similarity*, 73 FLA. L. REV. 591, 617 (2021).

share, or type of industry depends on that case's outcome.³⁴⁷ The algorithm will need to take judicial hierarchy, the appellate jurisdiction of regional circuit courts, and similar factors into account as appropriate.

The algorithm will also need to determine what happens should a new Supreme Court opinion abrogate an old position. The older cases in the dataset may now have diminished precedential value or even no precedential value. Westlaw's "red flags" show this capability is well within the grasp even of pre-AI technology.³⁴⁸ Even dissents, appropriately categorized, should form part of the AI dataset to minimize ideological stampeding and provide counterfactuals against which to test market outcomes. *Amex* illustrates this. *Amex*'s three-step test omits the balancing step in the rule of reason inconsistent with past practices.³⁴⁹ Justice Thomas had framed the defendant's burden simply as a "pro-competitive rationale."³⁵⁰ Justice Thomas accepted *Amex*'s various justifications at face value, reinforcing the notion that a mere "rationale" was sufficient.³⁵¹ Defendants do not even need to prove beneficial effects but simply offer a rationale.³⁵² Justice Thomas then repeated *Amex*'s unsupported statements to erroneously shift the burden of proof to plaintiffs to disprove the procompetitive benefits asserted.³⁵³

Courts are supposed to consider anticompetitive and procompetitive effects.³⁵⁴ While the majority endorsed the dicta, Justices signing the opinion may not realize the implications of their endorsement. The dissent clarifies that the majority opinion incorrectly stated the test since any justification satisfying a defendant's burden of production gives the defendant a win if plaintiffs cannot show a less restrictive alternative.³⁵⁵ It underscores the importance of dissenting opinions in AI training. In doing so, AI can help generalize information from legal and market data points to mark the path toward achieving policy goals.

As mentioned, case law is only the first step. It provides a starting point because precedent may or may not be based on sound economic analyses and ideology. Training AI using case precedents alone risks

347. *Id.*

348. Reference Attorneys, *Westlaw Tip of the Week: Checking Cases with KeyCite*, THOMSON REUTERS (Aug. 4, 2019), <https://legal.thomsonreuters.com/blog/westlaw-tip-of-the-week-checking-cases-with-keycite/>.

349. *Ohio v. Am. Express Co.*, 138 S. Ct. 2274, 2284 (2018).

350. *Id.*

351. *Id.* at 2288.

352. *Id.* at 2289.

353. *Id.* at 2289–90.

354. *Chicago Bd. of Trade v. United States*, 246 U.S. 231, 238 (1918).

355. *Am. Express Co.*, 138 S. Ct. at 2291 (Breyer, J., dissenting).

distorting economic realities further. For this reason, AI needs to be able to incorporate new data as markets evolve, and it already can do so. AI has evolved beyond operating in environments that remain static while it “thinks” so that its actions are executed on the same states from which they were computed.³⁵⁶ This critical function allows algorithms to determine how the law should assess future mergers or restraints based on past cases’ performance by looking at granular data like market shares, entry barriers, and output and prices.³⁵⁷ Over time, case law based on more robust AI-enabled economic analysis can help provide a yardstick for weeding out bad precedent.

A more rudimentary form of this refining process already exists through merger retrospectives that agencies do to improve agency review procedures and avoid generalizations.³⁵⁸ Antitrust agencies discern how mergers affect competition in specific relevant markets, typically using a “differences-in-differences” (DiD) method to compare the merged entity to a control group unaffected by the merger study differences in product price, quality, output, and innovation over time.³⁵⁹ Unfortunately, retrospectives are primitive and not very useful.

First, merger retrospectives require precise data on market products, both pre-and post-merger, as well as data on the agency’s predictions.³⁶⁰ However, a merger might affect several markets, have

356. NICK BOSTROM, *SUPERINTELLIGENCE: PATHS, DANGERS, STRATEGIES* 239 (2017).

357. Discussing reinforcement learning formulations of this kind, Kyle Wiggers writes:

[F]ormulations that drive an agent toward goals via rewards — wherein an agent receives a state from a set of possible states and selects an action from some set of possible actions according to a policy. The environment returns the next state sampled from a transition distribution and a reward, such that the agent learns to maximize the expected return from each state.

Kyle Wiggers, *Google’s AI Enables Robots to Make Decisions on the Fly*, VENTUREBEAT (Apr. 15, 2020), <https://venturebeat.com/2020/04/15/googles-ai-enables-robots-to-make-decisions-on-the-fly/>.

358. See Rebecca Kelly Slaughter, Commissioner, Fed. Trade Comm’n, Prepared Remarks: Merger Retrospective Lessons from Mr. Rogers at Hearings on Competition and Consumer Protection in the 21st Century: Merger Retrospectives (Apr. 12, 2019), https://www.ftc.gov/system/files/documents/public_statements/1513758/slaughter_remarks_at_ftc_retrospectives_hearing_4-12-19.pdf.

359. See Joseph J. Simons, Chairman, Fed. Trade Comm’n, Opening Remarks: Hearings on Competition and Consumer Protection in the 21st Century: Merger Retrospectives (Apr. 12, 2019), https://www.ftc.gov/system/files/documents/public_statements/1513555/merger_retrospectives_hearing_opening_remarks_chairman.pdf.

360. See Dennis W. Carlton, *Why We Need to Measure the Effect of Merger Policy*

network effects that impact markets where merging parties were not rivals, or simply be difficult to quantify, as they relate to innovation, quality, or variety.³⁶¹ Second, its methodology may scrutinize data sources, price measures, control groups, and statistical methods. These may affect the measured effect or counterfactual.³⁶² Third, for them to be useful, merger retrospectives need to go beyond price effects. Too many retrospective merger studies rely heavily on pricing data because they are what is most readily available. However, that limits its usefulness in capturing the many nonprice dimensions of competition that truly inform the antitrust analysis.³⁶³

In contrast, AI can maximize a preset reward without the need for continual human supervision.³⁶⁴ The algorithm chooses an action in the environment's initial state, representing a moment in time, randomly exploring the environment, gathering information about the environment, and developing an optimal policy, and optimizing performance by what data scientists call "expressing the relationship between the value of a state and the values of future states."³⁶⁵

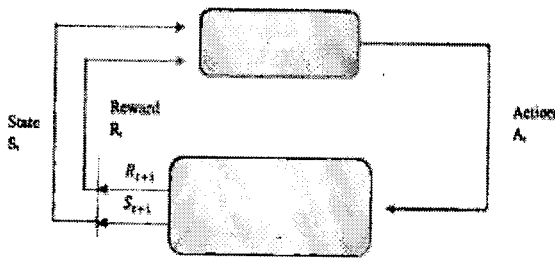


Figure 3: Reinforcement Learning³⁶⁶

and *How to Do It 4* (Nat'l Bureau of Econ. Research, Working Paper No. 14719, 2009).

361. See Karen Hoffman Lent & Kenneth B. Schwartz, *A Caution for Retrospective Merger Reviews*, MONDAQ (May 29, 2019) <https://www.mondaq.com/unitedstates/maprivate-equity/809820/a-caution-for-retrospective-merger-reviews> (noting that they are "left to subjective qualitative measures or disregarded entirely").

362. Gregory J. Werden, *Inconvenient Truths on Merger Retrospective Studies*, 3 J. ANTITRUST ENF'T 287, 291 (2015).

363. See Carlton, *supra* note 360, at 1 ("[R]etrospective studies that ask [only] whether prices went up post merger are surprisingly poor guides for analyzing merger policy.").

364. See Haney, *supra* note 296, at 430 ("The reward acts as a feedback mechanism, allowing the agent to learn independent of human training.").

365. *Id.* at 437 (describing the Bellman Equation, which defines the optimal policy and allows the agent to consider the reward in its present state as greater relative to similar rewards in future states).

366. RICHARD S. SUTTON, ANDREW G. BARTO, REINFORCEMENT LEARNING: AN

As it continues to the next state, the agent receives a reward and a set of choices, the algorithm selects an action, and the environment returns a reward and the next state.³⁶⁷ The reward teaches the algorithm what it should do and is meant to formalize a goal's idea.³⁶⁸ Through this iteration, it learns to take actions optimizing a reward, which would be, say, consumer welfare broadly defined.³⁶⁹ In essence, the total reward mirrors the legal "algorithm" we call antitrust's rule of reason.

This feature allows the algorithm to navigate dynamic market environments, not to stop the environment before computing.³⁷⁰ To the extent variables in its dataset need modification, AI training techniques use autoencoders to update word embeddings, machine translation, document clustering, sentiment analysis, and paraphrase detection.³⁷¹ Stacking autoencoders on top of each other allows the first autoencoder to focus on encoding features at one level of abstraction.³⁷² The next autoencoder uses the earlier output to recognize fact patterns and focus on encoding more abstract features.³⁷³ Defining features broadly helps avoid overfitting, which happens when the learner fits the function to the data.³⁷⁴ Overfitting also happens in legal reasoning when one ties a rule to the facts. The solution is to include more examples in training and testing the function against other test examples.³⁷⁵

Importantly, the algorithm's goal is to maximize its total reward rather than the reward for its immediate state, allowing it to achieve both static and dynamic efficiency goals.³⁷⁶ Like IBM's DeepMind playing chess, winning the game would be the reward. It makes it more likely to account for intertemporal analysis and counterfactuals such as those found in nascent acquisition or intellectual property

INTRODUCTION 48 (2d ed. 2018).

367. EUGENE CHARNAK, INTRODUCTION TO DEEP LEARNING 113 (2018).

368. *Id.*

369. See Jennifer Barry, Daniel T. Barry & Scott Aaronson, *Quantum Partially Observable Markov Decision Processes*, 90 PHYSICAL REV. A 032311-1 (2014).

370. *Id.*

371. See Venkata Krishna Jonnalagadda, *Sparse, Stacked and Variational Autoencoder*, MEDIUM (Dec. 6, 2018), <https://medium.com/@venkatakrisшна.jonnalagadda/sparse-stacked-and-variational-autoencoder-efe5bfe73b64>.

372. *Id.*

373. Gideon Lewis-Kraus, *The Great A.I. Awakening*, N.Y. TIMES MAG. (Dec. 14, 2016), <https://www.nytimes.com/2016/12/14/magazine/the-great-ai-awakening.html> (describing how the Google Brain network used stacked autoencoders and other network components to recognize cats).

374. GERON, *supra* note 343, at 28–29.

375. *Id.* at 29.

376. Haney, *supra* note 296, at 430 ("The rewards are used to update the agent's knowledge over time, so it learns to take actions returning the highest rewards.").

cases. Chicagoan judges manage the inherent indeterminacy of counterfactuals by favoring intellectual property rights owners. The algorithm may do so, too, making sacrifices to static gains to increase the probability of winning the overall game. However, unlike those Chicagoan judges, the algorithm can reach a much more informed conclusion because it can cogitate the data in ways that human judges cannot. In this way, the algorithm can actively challenge over-optimistic pronouncements about unproven technology or future market conditions.³⁷⁷ There is yet another benefit to AI adjudication. Courts applying the rule of reason typically ignore the defendant's justifications until plaintiffs produce sufficient evidence of anticompetitive harm, an approach that may lead to excessive false negatives.³⁷⁸ Defendants have even argued that two polar opposite effects were both pro-competitive.³⁷⁹ As a matter of law, evaluating competitive harm is inconsistent with a sliding scale approach to the burden of proof, which evaluates all relevant evidence.³⁸⁰ Algorithmic antitrust can allow courts to find the absence of cognizable justification strengthens a presumption of harm.

What happens when probabilities are indeterminate?³⁸¹ Without knowing the options, no system can predict the risk of any particular path.³⁸² Here, scholars are optimistic that most parametric evidence relevant to a rule of reason analyses can be identified either qualitatively or quantitatively.³⁸³ For instance, Hovenkamp took Chicago's reluctance to engage in bean-counting to task, arguing cost reductions or quality improvements can "measured by computing changes in production or distribution costs, multiplied by the predicted number of production units to which the new technology will apply," since every firm must have a means for determining whether

377. Carlo Cotrone, *Overcoming Cognitive Bias in Patent Filing and Maintenance Decisions*, IPWATCHDOG (Dec. 4, 2019) <https://www.ipwatchdog.com/2019/12/04/overcoming-cognitive-bias-patent-filing-maintenance-decisions/id=116566/>.

378. See Gavil & Salop, *supra* note 248, at 20.

379. See e.g., *United States v. N.D. Hosp. Ass'n*, 640 F. Supp. 1028, 1038 (D.N.D. 1986) (noting that a hospital argued it needed to prevent one group of customers from subsidizing another group).

380. See Gavil & Salop, *supra* note 248, at 41 ("[C]ourts have long acknowledged that evidence of the defendant's purpose in adopting certain restraints can be probative for evaluating the likelihood of competitive effects.").

381. FRANK H. KNIGHT, *RISK, UNCERTAINTY AND PROFIT* 233-34 (1921).

382. Richard N. Langlois & Metin M. Cosgel, *Frank Knight on Risk, Uncertainty, and the Firm: A New Interpretation*, 31 *ECON. INQUIRY* 456, 459-60 (1993) (explaining the meaning of Knight's distinction between risk and uncertainty).

383. See John M. Yun, *Are We Dropping the Crystal Ball? Understanding Nascent & Potential Competition in Antitrust*, 104 *MARQ. L. REV.* 613, 639 ("The real world is messy and measuring performance is no simple exercise. That being said, it can be done.").

investments in new technology or processes, or whether a contemplated merger would be worthwhile in dollar terms.³⁸⁴

Similarly, uncertainty about the future can be calculated and managed as risk, essentially a bounded prediction.³⁸⁵ It involves breaking down the likelihood of occurrence into probabilities. Analytical techniques or additional information can transform uncertainty into calculable risk. If that is difficult, one can substitute other decision-making methods for cost-benefit analysis, including extrapolating from the past, heuristics, and benchmarking.³⁸⁶ Professor Frank Knight distinguished between risk and uncertainty in decision making.³⁸⁷ Knight recognized that the future may be unknowable but could estimate the probability of outcomes with certainty and pick an optimal path among possible outcomes.³⁸⁸

AI can also factor in volatility, a proxy of risk usually depicted by the statistical concept of standard deviation. Volatility is easy to calculate and straightforward to understand and compare. On the other hand, it does not distinguish between upside and downside volatility. Risk-adjusted return measures ranked based on their return history show whether returns to the intellectual property right owner have been high enough to compensate for the risk.³⁸⁹

Of course, instructing the AI to identify a successful or unsuccessful outcome is less straightforward than a “win” in Go or chess. Ideology embedded in case law can make it challenging to accord appropriate weights to factors.³⁹⁰ However, by curating, synthesizing, and refining the applicable law, AI can dampen ideological swings while minimizing errors as judges employ algorithms that are constantly retraining themselves through

384. Herbert Hovenkamp, *Antitrust Harm and Causation*, 99 WASH. U. L. REV. 787, 48–49 (“As with any predictive science, estimating productive efficiency gains from a particular investment involves assumptions that may not always obtain, but to say that these changes are incapable of measurement, as Bork did, is simply not the way firms make decisions.”).

385. See PETER L. BERNSTEIN, *AGAINST THE GODS: THE REMARKABLE STORY OF RISK* 133 (1996) (discussing the distinction between uncertainty and risk and explaining that “[u]ncertainty means unknown probabilities” while risk is measurable).

386. See Richard A. Posner, *Uncertainty Aversion and Economic Depressions*, CHALLENGE, Sept.–Oct. 2009, at 25.

387. KNIGHT, *supra* note 381.

388. *Id.*

389. Josh Charlson, *13 Ways of Looking at Risk*, MORNINGSTAR (Aug. 20, 2020), <https://www.morningstar.com/articles/998966/13-ways-of-looking-at-risk>.

390. Ron Dolin, *Measuring Legal Quality: Purposes, Principles, Properties, Procedures, and Problems* (June 18, 2017) (unpublished manuscript) (on file with the Harvard Law School, Center on the Legal Profession at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2988647).

simulations in the same way AlphaGo Zero did. The algorithm can run potential decisions through predictive pathways and judges can verify if their intended judgment will give the results they intend.

Parties will need to do their part, presenting data to support the narratives they wish to advance. The data will be governed by the usual federal rules of evidence. Where they are lacking, such as the “value of technology,” parties will need to make the normative case to the judge for what that should encompass as they have done. How we set payoffs, particularly without markets to provide valuations (e.g., assessments of “good” outcomes – e.g., what access of patented technology is worth) may be challenging, but as futurecasting algorithms gain additional knowledge about the probabilities of occurrence, ambiguity disappears, and the choices become clearer.³⁹¹ AI scoring tools can then help to standardize concepts against technical and commercial criteria, curating data on the value of technology, anticipated short and long-term implications, and the likelihood of commercial success.³⁹² In such instances, judges need to articulate what kinds of corrections to precedent are warranted, so AI learning does not increase biases rather than reduce them.

In sum, the beauty of algorithm antitrust is that it can reach outcomes we cannot define in advance of the AI being run as “good” or “better” as the untrained neural network interrogates itself via the process of trial and error. Programming the AI to maximize reward in a predetermined environment allows it to directly optimize policy performance rather than learning from old data³⁹³ by updating the agent’s policy using good estimates of a particular policy’s advantage relative to another policy.³⁹⁴ The maximization process is dynamic, with the AI capable of scouring options to optimize the best rewards under the given circumstances,³⁹⁵ mirroring how courts operationalize antitrust policy—computing the expected reward from executing a policy in a given environment.³⁹⁶ That reward could be wider access to a vaccine at a sustainable price to the patent owner, access to FRAND technology without licensing restraints imposed by

391. See Gary Charness & Dan Levin, *When Optimal Choices Feel Wrong: A Laboratory Study of Bayesian Updating, Complexity, and Affect*, 95 AM. ECON. REV. 1300 (2005).

392. Carlo Cotrone, *Overcoming Cognitive Bias in Patent Filing and Maintenance Decisions*, IPWATCHDOG (Dec. 4, 2019), <https://www.ipwatchdog.com/2019/12/04/overcoming-cognitive-bias-patent-filing-maintenance-decisions/id=116566>.

393. *Proximal Policy Optimization*, OPENAI SPINNING UP, <https://spinningup.openai.com/en/latest/algorithms/ppo.html> (last visited May 16, 2022).

394. Haney, *supra* note 296, at 439.

395. See *id.* at 431 (“[T]he agent tries a variety of actions, both stochastically and deterministically, progressively favoring those that return the best value.”).

396. See *id.* at 432 (discussing “policy iteration for computing an optimal policy”).

a dominant patent owner, or allowing the acquisition of nascent technology. The difference here, as compared to analysis without AI, is that by controlling the variables, reinforcement learning allows the iterative process of updating those policies to converge on an optimal policy and optimal value function through a finite number of iterations.³⁹⁷ In this way, AI can help generalize market information to help judges better assess predictions about intervention and achieve policy goals by formulating better antitrust rules.³⁹⁸

The algorithm randomly plays out certain results, learns, if necessary, with input from data scientists in each iteration, adjusts its weights and parameters, and chooses advantageous moves with increasing finesse.³⁹⁹ The feedback loop causes the algorithm's nodes to change their weights, so case precedents refined by new case law and market data may eventually yield a different, better outcome over time.⁴⁰⁰ It allows adjudicating to become less a question of "ideology plus facts plus law equal the outcome," and more a question of whether the data supports the legal outcome that the parties or, if on appeal, one that the lower court advanced.

3. A Reasoned Shift Toward Per Se?

Formulating optimal legal rules require judges to balance expected consumer welfare harm from "false positive" errors (i.e., prohibiting beneficial conduct) versus "false negative" errors (i.e., permitting harmful conduct). This task requires judges to access information on the frequency and impact of the error, the likelihood of deterrence, and the cost to the administrative process.⁴⁰¹ Judges then assign a probability value to the likelihood of anticompetitive harm occurring may anchor based on their own past bias or assess the other event happening probability.⁴⁰² For instance, they may assign

397. *See id.*

398. MAX TEGMARK, LIFE 3.0: BEING HUMAN IN THE AGE OF ARTIFICIAL INTELLIGENCE 85–86 (2017).

399. TERRENCE J. SEJNOWSKI, THE DEEP LEARNING REVOLUTION 20 (2018).

400. *See* Stephen McJohn & Ian McJohn, *Fair Use and Machine Learning*, 12 NE. U. L. REV. 99, 135 (2020).

401. Gavil & Salop, *supra* note 248, at 17.

402. *See generally* Amos Tversky & Daniel Kahneman, *Judgment Under Uncertainty: Heuristics and Biases*, 185 SCIENCE 1124, 1128 (1974) (discussing the evaluation of probabilistic outcomes). Discussing how judges might evaluate probability, Daniel Crane writes:

Judges or regulators asked to decide on the absolute probability that a merger will produce anticompetitive effects might tend to lowball the probability because of a general skeptical

the probability of harm occurring based on whether they think defendants may lose their incentive to innovate if forced to grant access to its proprietary technology.⁴⁰³ They may also be swayed to insist that the plaintiffs debunk the defendants' purported efficiencies from an offending restriction even before defendants have carried their burden in proving that the restriction is warranted.

Presumptions like *per se* rules help judges set evidentiary burdens when applying the rule of reason based on logic, experience, and economic evidence about the industry and the category of conduct.⁴⁰⁴ As Professors Andrew Gavil and Steve Salop observe, “[c]ertain evidence may not be reasonably available or will be unreliable because it (i) too often signals an erroneous conclusion, or (ii) is too likely subject to confusion, misinterpretation, or bias by the trial court or jury.”⁴⁰⁵

Chicagoan wisdom peeled back courts' ability to rely on the *per se* rule, counseling that judges employing the rule of reason should limit the amount of information necessary to evaluate competitive effect since juggling more information risked more errors.⁴⁰⁶ However, what conduct is considered “suboptimal” is circular, absent moralizing that courts sometimes avoid, since it depends on whether the conduct is on

inclination as to proof of speculative future events but raise their estimate of the probability of harms if asked to assess that probability at the same time that they were assessing the probability of efficiencies.

Daniel A. Crane, *Rethinking Merger Efficiencies*, 110 MICH. L. REV. 347, 369 (2011):

403. See e.g., Daryl Lim, *Predictive Analytics*, 51 LOY. U. CHI. L.J. 161, 216 (2019).

404. The opinion in *Arizona v. Maricopa County Medical Society* elaborates:

[T]he argument that the *per se* rule must be rejustified for every industry that has not been subject to significant antitrust litigation ignores the rationale for *per se* rules, which in part is to avoid ‘the necessity for an incredibly complicated and prolonged economic investigation into the entire history of the industry involved, as well as related industries, in an effort to determine at large whether a particular restraint has been unreasonable—an inquiry so often wholly fruitless when undertaken’.

Arizona v. Maricopa Cnty. Med. Soc’y, 457 U.S. 332, 349–51 (1982) (citations omitted).

405. Gavil & Salop, *supra* note 248, at 20.

406. See *supra*, Part II.B.

balance harmful, which is exactly the empirical question courts cannot balance in the abstract. In contrast, *per se* rules define certain conduct as harmful without proving harm or engaging in balancing. Getting rid of *per se* rules stole courts' ability to define conduct that was potentially harmful in the first instance, without the need to engage in empirical analysis.

AI allows judges to gradually broaden the instances when it might be appropriate to apply *per se* rules of illegality *and* legality. They can now rely on computing muscle and a trove of data analytics to confidently assume that a confluence of certain facts would likely result in anticompetitive harm. AI can help keep the weighting of the probability of events consistent while adjusting weights in the data sets based on new economic evidence to reward producers who best serve consumer wants without requiring courts to act as central planners.⁴⁰⁷

With nascent competition, AI predicts the impact of “killer acquisitions,” run simulations to determine optimal contestability conditions and better map synergies that affect innovation pathways by tracing user adoption of the technology.⁴⁰⁸ Empirically, only about 7% of pharmaceutical acquisitions fall within the “kill zone.”⁴⁰⁹ What happens when the AI system indicates a “killer acquisition” that would squelch nascent competition?

One possibility is for the court to shift the burden of proof to defendants as is done with the quick look approach.⁴¹⁰ This heuristic recognizes instances where the likelihood of harm warrants place on defendants, who have both comparative advantage and the incentive to prove that their conduct generates the efficiencies they claim, proving those claims.⁴¹¹ Scholars advocate having acquirers prove the benefits and efficiencies of the transaction to safeguard against killer acquisitions.⁴¹² With the burden of production, the idea is that the party with the best incentive and information to assist the court should be the one task to produce that information. The acquirer, however, may not have sufficiently compelling data to demonstrate the transaction will be pro-competitive. The high degree of market power and profit margins in markets where killer acquisitions are a

407. *See supra*, Part II.B.

408. *See supra*, Part II.B.

409. *See supra*, Part II.B.

410. *See generally* *FTC v. Ind. Fed'n of Dentists*, 476 U.S. 447 (1986) (applying the quick look approach).

411. *Id.*

412. Janith Aranze, *DG Comp Chief Economist: Reverse Burden of Proof to Catch Killer Acquisitions*, GLOBAL COMPETITION REV. (Nov. 20, 2018), <https://globalcompetitionreview.com/article/1177095/dg-comp-chief-economist-reverse-burden-of-proof-to-catch-killer-acquisitions>.

concern would diminish over-enforcement concerns.⁴¹³

Thus, in appropriate instances, courts can either shift the burden of proof to the antitrust defendant, per Senator Klobuchar's proposed bill, but without the obstacle of congressional gridlock,⁴¹⁴ prohibit, or allow the restraint outright. The difference is that with AI, courts can confidently employ legal heuristics like per se rules and the quick look approach. But who would take the lead in developing algorithmic antitrust? We answer this question next.

B. Testbeds for Revolution

To bring an algorithm for antitrust adjudication from concept to reality, human-AI teams will need to define the parameters of "harm to competition," assessing whether it is more or less likely from a particular set of conditions, and then stress testing and refining those results. In this way, AI can help shift antitrust adjudication from ideology to empirics. One agency that could help is the FTC. FTC Commissioner Chopra and Professor Khan observed that "Congress envisioned that the Commission's data collection from market participants would ensure that the agency stayed abreast of evolving business practices and market trends and that it would use this expertise to establish market-wide standards clarifying what practices constituted an 'unfair method of competition,' even as the market evolved."⁴¹⁵

Congress enacted the Federal Trade Commission Act to create an administrative agency specifically tasked with shaping antitrust rules and answering the legislature.⁴¹⁶ It intended the FTC to be an expert administrative agency to collect confidential business information and conduct industry studies.⁴¹⁷ In doing so, Congress endowed the FTC with expansive information-gathering power and a mandate to police "unfair methods of competition."⁴¹⁸ The FTC would continuously track

413. *Id.* ("[A]llowing a company such as Google, which already has a 'zillion applications', to acquire yet another application has limited social benefit compared to stopping Google from acquiring a smaller business that could go on to become its next competitor.").

414. Neil D. Weinstein, *Unrealistic Optimism About Future Life Events*, 39 J. PERSONALITY & SOC. PSYCH. 806, 806 (1980) (describing the optimism bias phenomenon).

415. Chopra & Khan, *supra* note 27, at 364.

416. Neil W. Averitt, *The Meaning of "Unfair Methods of Competition" in Section 5 of the Federal Trade Commission Act*, 21 B.C. L. REV. 227, 236-38 (1980).

417. 15 U.S.C. § 46(b) (2018) (authorizing the FTC to require corporations to file informational reports regarding the company's "organization, business, conduct, practices, management, and relation to other corporations").

418. 15 U.S.C. § 45 (2018).

business conduct and “make explicit those unexpressed standards of fair dealing” that Congress outlined.⁴¹⁹

In the 1960s and 1970s, the FTC improved its substantive processes and the quality of its competition and consumer protection analysis.⁴²⁰ In doing so, it re-invigorated its antitrust enforcement policy in response to complaints the agency was in decay and failed to address matters of economic importance.⁴²¹ In 2002, the FTC concluded that pay-for-delay settlements impeded generic drug entry.⁴²² These settlements deviated from tested fact patterns previously condemned by courts, and its studies ultimately helped sway the Supreme Court in *Actavis*.⁴²³

What happens when companies do not voluntarily disclose information regarding their internal documents that identify illegal activity? Section 6(b) of the FTC Act empowers the FTC to require entities to file “annual or special . . . reports or answers in writing to specific questions” to provide information about the entity’s “organization, business, conduct, practices, management, and relation to other corporations, partnerships, and individuals.”⁴²⁴ If a party fails to comply with a 6(b) order after receiving a notice of default from the Commission, the Commission may commence suit in federal court.⁴²⁵ After the expiration of a thirty-day grace period, a defaulting party is liable for a penalty for each day of noncompliance.⁴²⁶ The Commission’s 6(b) authority also enables it to conduct wide-ranging studies that do not have a specific law enforcement purpose.⁴²⁷ An example is the Commission’s October 2016 report on “Patent Assertion Entity Activity.”⁴²⁸

419. Averitt, *supra* note 416, at 237.

420. Jones & Kovacic, *supra* note 107, at 231.

421. See AM. BAR ASSOC., REPORT OF THE ABA COMMISSION TO STUDY THE FEDERAL TRADE COMMISSION (1969); EDWARD F. COX ET AL, THE NADER REPORT ON THE FEDERAL TRADE COMMISSION (1969).

422. FED. TRADE COMM’N, GENERIC DRUG ENTRY PRIOR TO PATENT EXPIRATION: AN FTC STUDY, at i (July 2002), [<https://perma.cc/A2US-Y8RG>].

423. See Fed. Trade Comm’n v. Actavis, Inc., 570 U.S. 136, 157 (2013) (“[T]he Commission has referred to studies showing that reverse payment agreements are associated with the presence of higher-than-competitive profits—a strong indication of market power.”).

424. 15 U.S.C. § 46(b) (2018).

425. 15 U.S.C. § 50 (2018).

426. *Id.*; 16 C.F.R. § 1.98(f) (2022).

427. 15 U.S.C. § 46(f) (2018) (authorizing the FTC to “make public from time to time” portions of the information that it obtains, where disclosure would serve the public interest).

428. See FED. TRADE COMM’N, PATENT ASSERTION ENTITY ACTIVITY (2016), https://www.ftc.gov/system/files/documents/reports/patent-assertion-entity-activity-ftc-study/p131203_patent_assertion_entity_activity_an_ftc_study_0.pdf.

The FTC is familiar with the challenges presented by data and algorithms to make decisions about consumers. It has brought cases involving AI and automated decision-making and used its rule-making authority to prohibit unfair and deceptive practices to address consumer injury arising from the use of AI and automated decision-making.⁴²⁹ In 2016, the FTC issued a report titled *Big Data: A Tool for Inclusion or Exclusion?*, advising companies using AI to reduce the opportunity for bias, and in 2018 held hearings to understand the competitive impact of AI on predictive analytics.⁴³⁰ Properly deployed, the FTC's powerful resources can make a useful contribution to make algorithmic antitrust an operational reality.

In an article provocatively titled *Can AI Replace the FTC?*, Giovanna Massarotto and Ashwin Ittoo developed and used existing AI techniques based on an unsupervised approach to discover underlying patterns from past antitrust cases classified by commuting similarity.⁴³¹ They conclude that "teaching antitrust to an algorithm is possible" and "having an increasingly fast and uniform way to enforce antitrust principles is fundamental as we move into a new digital economic transformation."⁴³²

Using reported cases, Massarotto and Ittoo "extracted data regarding: a) the year; b) the name of the proceeding (which usually identifies the parties involved); c) the affected industry; d) the investigated anticompetitive conduct; e) the adopted remedies."⁴³³ They visualized correlations according to a heat map, displayed in Figure 4. The greener the cell, the higher the correlation.⁴³⁴ The study found that "cases from the data/computer industry were generally clustered with those in the healthcare industry, suggesting that these industries raise the similar antitrust concerns."⁴³⁵

Moreover, the algorithm "clustered cases whereby conspiracy, the most detected conduct, is strictly related to the exchange of information, and as a consequence, the 'limitation in the exchange of information' is recommended as one of the most common remedy"⁴³⁶

429. Andrew Smith, *Using Artificial Intelligence and Algorithms*, FED. TRADE COMM'N: BUS. BLOG (Apr. 8, 2020), <https://www.ftc.gov/news-events/blogs/business-blog/2020/04/using-artificial-intelligence-algorithms>.

430. *Id.*

431. Giovanna Massarotto & Ashwin Ittoo, *Can AI Replace The FTC?* (Jan. 9, 2021) (unpublished paper) (https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3733324).

432. *Id.* at 1.

433. *Id.* at 9.

434. *Id.* at 12 ("[E]ach variable is highly correlated to itself, which is natural. Furthermore, the heat map revealed no apparent correlation among variables, which do not warrant further multi-collinearity tests.").

435. *Id.* at 2.

436. *Id.*

They conclude that “AI techniques can turn out as a valuable tool for the USA antitrust regulator. Companies can also benefit from AI techniques as they make more predictable what can be and cannot be considered anticompetitive and possible remedies to adopt if some anticompetitive practices are detected.”⁴³⁷ Thus while AI cannot replace human adjudicators, like global positioning systems on our smartphones, the technology can help them better make sense of new terrain by combining and processing relevant data.

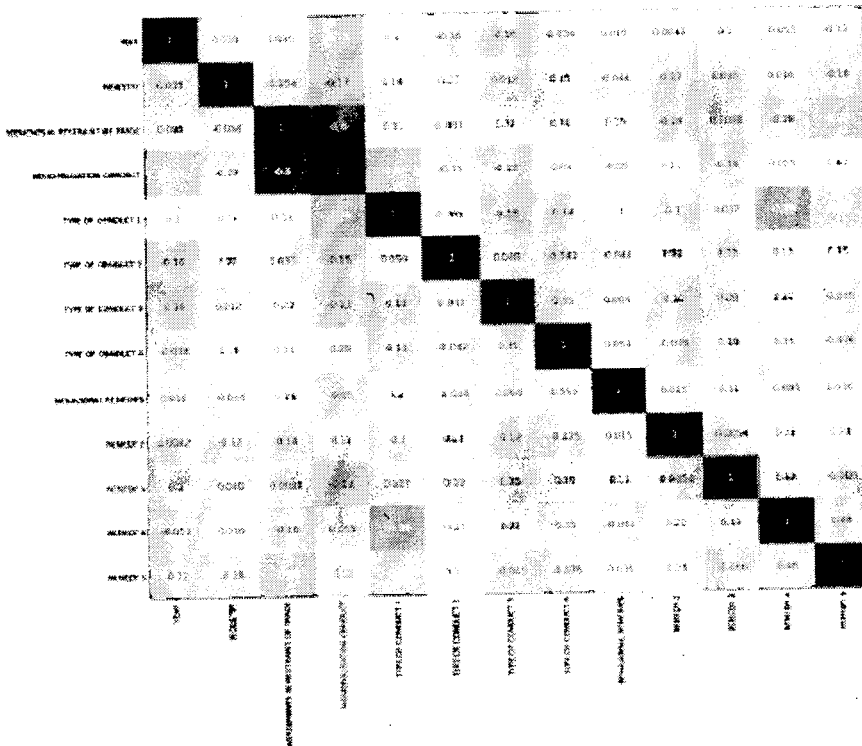


Figure 4: Heat Map with Variable Correlations⁴³⁸

Another possible testbed for developing algorithmic antitrust is academia. Launched in January 2021, Stanford University Codex Center’s “Computational Antitrust” project aims to use legal informatics to navigate complex and dynamic markets by automating antitrust procedures and improving antitrust analysis.⁴³⁹ Stanford’s

437. *Id.* at 34.

438. *Id.* at 13.

439. Stanford Ctr. for Legal Informatics, *Computational Antitrust Project*,

project aims to provide companies with compliance tools to lead to better-informed decisions.⁴⁴⁰ The project has already attracted admirers, with the Justice Department announcing its participation shortly after the launch, and no less than thirty-five academics from law, computer science, and economics, as well as developers, policymakers, and antitrust agencies from around the world, have committed to harnessing technology and automation to improve antitrust enforcement.⁴⁴¹

Project Leader Thibault Schrepel envisions “computational antitrust” forensically identifying illegal intent through companies’ internal documents and creating new channels for the automated transmission of data between companies to agencies.⁴⁴² Schrepel is also optimistic that AI will streamline comparing “large data sets across different periods and industries to detect anomalies,”⁴⁴³ “enable market players to conduct more thorough internal audits,”⁴⁴⁴ enable agencies to assess remedies and consumer welfare, and “understand what conditions had allowed the emergence of new players when the market was deemed to have tipped.”⁴⁴⁵

So far, I have explained the promise of algorithmic antitrust, its mechanics, and how it can be used to formulate better antitrust rules. However, when AI adopts obscure decision-making models to carry on their decision processes, some or all their processes occur in a “black box.”⁴⁴⁶ How the algorithm arrived at a recommendation may be unexplainable, giving rise to concerns over bias (in selecting the data and interpreting the results) and transparency in that process.⁴⁴⁷

CODEX, <https://law.stanford.edu/codex-the-stanford-center-for-legal-informatics/computational-antitrust-project/> (last visited Feb. 28, 2022) (“The implementation of computational methods can indeed contribute to maintain and improve antitrust agencies’ ability to detect, analyze, and remedy anticompetitive practices. Furthermore, these tools can also simplify merger control and related procedures.”).

440. *Id.*

441. *Id.*; see also *DOJ Teams Up with Stanford Law for Antitrust Project*, CPI (Jan. 19, 2021), <https://www.competitionpolicyinternational.com/doj-teams-up-with-stanford-law-for-antitrust-project/>.

442. Thibault Schrepel, *Computational Antitrust: An Introduction and Research Agenda*, 1 STANFORD COMPUTATIONAL ANTITRUST 1, 2 (2021), <https://law.stanford.edu/codex-the-stanford-center-for-legal-informatics/computational-antitrust-publications/>.

443. *Id.* at 7.

444. *Id.* (“In the future, one could imagine the design of new tools for assessing compliance with antitrust laws (almost instantaneously).”).

445. *Id.* at 10.

446. See, e.g., Yavar Bathaee, *The Artificial Intelligence Black Box and the Failure of Intent and Causation*, 31 HARV. J.L. & TECH. 889, 907 (2018) (“To be sure, we may be able to tell what the AI’s overarching goal was, but black-box AI may do things in ways the creators of the AI may not understand or be able to predict.”).

447. *Id.*

Relevant training data may also be scarce.

III. ADDRESSING IMPLEMENTATION CHALLENGES

For antitrust law to properly integrate AI, it must enjoy a degree of legitimacy both among those who use it and those governed by it. Being a social enterprise, the law requires such agreement as a precondition to its existence. In getting down to the brass tacks, this Part confronts well-known concerns with AI deployment: bias, accountability, and data availability. It explains that these concerns, while legitimate, can be significantly mitigated or, in some cases, comprehensively addressed.

A. Bias, Transparency, and Accountability

Humans are not designed to process vast amounts of qualitative data, a problem the economic literature calls “bounded rationality.”⁴⁴⁸ They rely on heuristics such as ideology to navigate the world,⁴⁴⁹ shaped by personal experiences, beliefs, and biology.⁴⁵⁰ Coding is not value-neutral, and biases may seep into the algorithmic code, filtering into training data and the weights judges may assign to the algorithm.⁴⁵¹

448. Expanding on the meaning of “bounded rationality,” Shyamkrishna Balganesh writes:

Foreseeability connects . . . to the notion of bounded rationality. When certain events or consequences are unlikely to have formed a significant part of an actor's decisions for an action, the law characterizes them as unforeseeable and avoids attributing them to the actor. In economic terms, foreseeability thus enables courts to distinguish between events that are likely to have formed part of an actor's ex ante incentives for action and those that are unlikely to have done so, thereby restricting recovery to the former alone.

Shyamkrishna Balganesh, *Foreseeability and Copyright Incentives*, 122 HARV. L. REV. 1569, 1574 (2009).

449. See *supra* Part I.A.

450. Cahoy, *supra* note 124, at 13.

451. See Dan L. Burk, *Algorithmic Fair Use*, 86 U. CHI. L. REV. 283, 283 (2019) (noting that “the design values embedded in algorithms will inevitably become embedded in public behavior and consciousness,” thus replicating the system designer’s biases or opinions.); see also David Lehr & Paul Ohm, *Playing with the Data: What Legal Scholars Should Learn About Machine Learning*, 51 U.C. DAVIS L. REV.

Our inability to explain how AI makes decisions may impede its adoption in antitrust adjudication. Scholars have converged on algorithmic biases in just a few short years, highlighting for debate a wide scope of topics, including automation, datafication surveillance,⁴⁵² and profiling loan credit risk and criminal recidivism based on race.⁴⁵³ For instance, one study revealed that COMPAS, an algorithm-based program used to predict recidivism, was “somewhat more accurate than a coin flip.”⁴⁵⁴ The program “turned up significant racial disparities” in “falsely flag[ing] black defendants as future criminals, wrongly labeling them this way at almost twice the rate as white defendants. White defendants were mislabeled as low risk more often than black defendants.”⁴⁵⁵

Professor Andrew Selbst expressed concern that using AI in adjudication exchanges one problem, bounded rationality, for another – the inability to oversee or completely understand how AI makes decisions.⁴⁵⁶ Sophisticated algorithms are too complicated to be read and evaluated even by data scientists and software engineers.⁴⁵⁷ Moreover, the massive scale of datasets makes it hard to scrutinize their contents and perpetuate algorithmic bias thoroughly.⁴⁵⁸

653, 669–701 (2017).

452. Stephanie Bornstein, *Antidiscriminatory Algorithms*, 70 ALA. L. REV. 519, 522–23 (2018); Danah Boyd, *Undoing the Neutrality of Big Data*, 67 FLA. L. REV. F. 226, 227 (2016); Margaret Hu, *Algorithmic Jim Crow*, 86 FORDHAM L. REV. 633, 650 (2017); Mikella Hurley & Julius Adebayo, *Credit Scoring in the Era of Big Data*, 18 YALE J.L. & TECH. 148, 196–98 (2016); Aziz Z. Huq, *Racial Equity in Algorithmic Criminal Justice*, 68 DUKE L.J. 1043, 1053–54 (2019); Pauline T. Kim, *Data-Driven Discrimination at Work*, 58 WM. & MARY L. REV. 857, 860–61 (2017); Mary Madden, et al., *Privacy, Poverty, and Big Data: A Matrix of Vulnerabilities for Poor Americans*, 95 WASH. U. L. REV. 53, 55–56 (2017); Sandra G. Mayson, *Bias In, Bias Out*, 128 YALE L.J. 2218, 2221 (2019); Frank Pasquale & Danielle Keats Citron, *Promoting Innovation While Preventing Discrimination: Policy Goals for the Scored Society*, 89 WASH. L. REV. 1413, 1415 (2014).

453. See Meghan J. Ryan, *Secret Conviction Programs*, 77 WASH. & LEE L. REV. 269, 303–05 (2020).

454. See Julia Angwin et al., *Machine Bias*, PROPUBLICA (May 23, 2016), <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>.

455. See *id.*

456. Andrew D. Selbst, *Negligence and Ai's Human Users*, 100 B.U. L. REV. 1315, 1362 (2020) (“For now, there is no legal requirement for the AI system to be interpretable or explainable.”).

457. See, e.g., Bathaee, *supra* note 446, at 907 (“To be sure, we may be able to tell what the AI’s overarching goal was, but black-box AI may do things in ways the creators of the AI may not understand or be able to predict.”).

458. Khari Johnson, *AI Research Survey Finds Machine Learning Needs a Culture Change*, VENTUREBEAT (Dec. 26, 2020), <https://venturebeat.com/2020/12/26/ai-research-survey-finds-machine-learning-needs-a-culture-change/> (reporting “biased results about Muslims, people who are queer or do not conform to an expected gender

Training datasets may contain biases and lead to unfair and legally erroneous decisions. For example, a case from the 1970s would likely be Chicagoan, weighing potential losses to dynamic efficiency more than potential gains from the intervention.⁴⁵⁹ In contrast, earlier cases may be more Neo-Brandeisian by comparison, favoring small businesses more by a political preference for atomism than economic efficiency.⁴⁶⁰ The training data may identify the criteria for evaluation and replicate the problems going forward if based on bad theories. This problem is all the more systemic in reinforcement learning, where the reward may be a biased identification, generating even more bias over time, raising the risk of what Professor Nachbar labeled “snowballing unfairness.”⁴⁶¹ Codes will likely be path-dependent, as Nachbar observed, “based on decisions made in previous iterations of the program – prompting a cascading search for purpose.”⁴⁶² For instance, license terms suggestive of anticompetitive conduct rely on comparing terms and terms previously found to be offensive. The risk is that the algorithm overweighs superficial features from prior enforcement decision-making to entrench idiosyncrasies rather than build precise noncompliance models.

An industry shift toward trade secrets exacerbates the quest for transparency and explainability. A 2014 Supreme Court decision made it difficult for software inventions to receive or retain patent rights, leading software developers, including those in the AI industry, to protect their technology using trade secrets instead.⁴⁶³ The pivot to trade secrets discourages the disclosure and dissemination of new technology inimical to the patent system. It requires exactly the opposite – a continuing obligation to keep the technology secret,⁴⁶⁴ discouraging AI developers from sharing information critical to better auditing its decision-making process.⁴⁶⁵ Patent reform to address this has long been in the works, but the end

identity, people who are disabled, women, and Black people, among other demographics”).

459. See, e.g., Roger G. Noll & James E. Krier, *Some Implications of Cognitive Psychology for Risk Regulation*, 19 J. LEGAL STUD. 747, 758 (1990).

460. See e.g., *United States v. Aluminum Co. of Am.*, 148 F.2d 416 (2d Cir. 1945) (favoring an organization of industry in small units which can effectively compete with one another).

461. Nachbar, *supra* note 269, at 522.

462. *Id.* at 48.

463. *Alice Corp. Pty. v. CLS Bank Int'l*, 573 U.S. 208 (2014).

464. See generally Daryl Lim, *The Influence of Alice*, 105 MINN. L. REV. HEADNOTES 345 (2021).

465. Meghan J. Ryan, *Secret Algorithms, IP Rights, and the Public Interest*, 21 NEV. L. J., 61, 106 (“The availability of patents for software is also currently unpredictable, but loosening subject matter eligibility restrictions on software patents could perhaps improve predictability here, as well as further transparency goals.”).

is nowhere in sight.⁴⁶⁶

Professor Meghan Ryan argued that “[w]ithout access to the details of the computerized algorithms providing incriminating evidence against them, these defendants lack the opportunity to challenge this incriminating evidence that poses real questions of accuracy, not to mention bias.”⁴⁶⁷ Ryan further observes that “the secrecy surrounding these algorithms that affect the dispositions of criminal cases and criminal defendants’ futures goes beyond shocking and may even amount to constitutional violations.”⁴⁶⁸

Before rejecting AI adoption on the grounds of transparency, however, it is helpful to recall that antitrust’s rule of reason itself is a black box.⁴⁶⁹ Human decision-making is not significantly more accountable than AI either. Indeed, it may even be less so since thought processes occur within the private space between our ears. Courts operating on ideology may write for justification and not for explanation. This conclusion discounts the precedents’ value as accurately revealing the facts that the legal principles within those precedents are supposed to operate on. In contrast, AI decision-making may provide a better forum for stakeholders to improve the process once known that the algorithm produces systematically problematic outcomes.⁴⁷⁰

The temptation to dumb down AI simply to further explainability should similarly be avoided. The lack of explainability is a feature of AI’s ability to recognize connections not obvious to humans, and indeed the purpose of using them in the first place.⁴⁷¹ While dumbing down AI can make it more parsable, that has its own set of problems - the algorithm may become less effective or more vulnerable to gaming and adversarial learning by regulated parties.⁴⁷² Moreover, judges employ well-established remedies when issuing protective orders to safeguard litigants’ trade secrets during litigation, including making the algorithm available for in-camera examination or making it available under seal.⁴⁷³ Finally, full disclosure of a system’s source

466. See generally Lim, *supra* note 464.

467. Ryan, *supra* note 465, at 65, 88 (stating that “the true accuracy of these tools often remains unknown”).

468. *Id.* at 25.

469. See *infra* Part I.A.

470. See Stucke, *supra* note 306, at 1461–66 (describing the difficulty of rule of reason analysis today).

471. Selbst, *supra* note 456, at 1362 (“If we did not think that these nonintuitive relationships were commonly discoverable by AI, there would be less motivation to use AI in the first place.”).

472. See ENGSTROM ET AL., *supra* note 324, at 86.

473. See, e.g., FED. R. CIV. P. 26(c)(1)(G) (stating that “[t]he court may, for good cause, issue an order to protect a party or person . . . [by] requiring that a trade secret or other confidential research, development, or commercial information not be

code and data is pointless if judges lack the technical understanding necessary to make sense of them.

Ultimately, some bias is inevitable and should be tolerated. The nature of employing standards like the rule of reason is that the adjudicator must make some value judgment. For instance, in one copyright case, the Eleventh Circuit criticized the lower court for assessing fair use factors formulaically because “fair use is not a mechanical determination.”⁴⁷⁴ Similarly, in the antitrust context, FTC Commissioner Rebecca Slaughter “had long found it “bizarre” that antitrust enforcement in the United States has often striven to be “value-neutral.”⁴⁷⁵ She points out that any decision to bring an enforcement action will affect consumers, making it impossible for enforcement to be value-neutral.⁴⁷⁶ Every policy priority rests on values, such as when criminal prosecutors prioritize enforcement against violent criminals rather than immigrants. Similarly, every decision requires an agency or court to pick winners and losers. The better approach, argued by Slaughter, is to be aware of those winners and losers and the impact antitrust enforcement has on them.⁴⁷⁷

For these reasons, those seeking algorithmic transparency may find algorithmic accountability both a more realistic and helpful goal.⁴⁷⁸ Accountability attempts to explain what both the algorithms and their users seek to achieve.⁴⁷⁹ It is a well-developed concept in the law. Consider anti-discriminatory rules that seek accountability through explainability by interrogating decision-makers on whether outcomes are justified.⁴⁸⁰ Judges designed doctrines such as the

revealed or be revealed only in a specified way”); Fed. Open Mkt. Comm. of Fed. Reserve Sys. v. Merrill, 443 U.S. 340, 356 (1979) (“The federal courts have long recognized a qualified evidentiary privilege for trade secrets and other confidential commercial information.”).

474. Cambridge Univ. Press v. Albert, 906 F.3d 1290, 1300–01 (11th Cir. 2018).

475. Lauren Feiner, *How FTC Commissioner Slaughter Wants to Make Antitrust Enforcement Antiracist*, CNBC (Sept. 26, 2020), <https://www.cnbc.com/2020/09/26/ftc-commissioner-slaughter-on-making-antitrust-enforcement-antiracist.html>.

476. *Id.*

477. *Id.*

478. Nachbar, *supra* note 269, at 557 (“Providing that incentive for accountability rather than requiring unattainable transparency, should be the goal in regulating computational decision-makers.”).

479. *Id.* at 558 (“Delegation to computational decision-makers may require us to confront many of the things that have been implicit and unspoken in our own human decision-making.”).

480. Courts routinely examine cases of alleged discrimination under Title VII of the Civil Rights Act of 1964. See, e.g., Section 703(a)(1) (prohibiting an employer from “discriminat[ing] against any individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual’s race, color, religion, sex, or national origin”); see also Texas Dep’t of Cmty. Affs. v. Burdines, 450 U.S. 248, 252–53 (1981); Graham v. Long Island R.R., 230 F.3d 34, 38 (2d Cir. 2012);

McDonnell Douglas burden-shifting framework and the Griggs' approach to disparate impact precisely to determine whether a justifiable reason exists for a facially discriminatory practice.⁴⁸¹ Whether a justification exists says nothing about whether and to what extent they relied on them in making their decision. So should antitrust law.

With algorithmic antitrust, we can use an interpretable model and substituting components in the system with the more interpretable facets. Decision trees used in AI analyses reliably track how courts apply legal standards to facts.⁴⁸² Decision trees are composed of internal nodes representing tests on features or attributes, with each branch represents a possible outcome.⁴⁸³ The path from roots to leaves represents the classification rules.⁴⁸⁴ The algorithm typically uses "if-then rules," where the "if" clause combines conditions on the input variables.⁴⁸⁵

Consider the Monte Carlo Tree Search (MCTS), which explores possible case outcomes options and narrowing down those options based on how well they can maximize desired outcomes (see Figure 5 below).⁴⁸⁶ An automated algorithmic checker predicts based on definable features such as case law and data pertinent to the facts into nodes, providing accountability.⁴⁸⁷ Like their namesakes, they leave a trail of decisions in their wake, which like modern vote-counting machines, can be applied manually if necessary.⁴⁸⁸ The algorithm employs a "lookahead" to utilize deep neural networks to correctly maintain the tradeoff between exploring new sequences of outcomes

Peele v. Country Mut. Ins. Co., 288 F.3d 319, 326 (7th Cir. 2002).

481. McDonnell Douglas Corp. v. Green, 411 U.S. 792, 802 (1973) (outlining a "burden-shifting analysis" for proving a violation of the prohibition against discrimination contained in Title VII on the basis of indirect evidence of discrimination); Griggs v. Duke Power Co., 401 U.S. 424 (1971) (establishing the legal precedent for so-called "disparate-impact" lawsuits involving instances of racial discrimination).

482. See McJohn & McJohn, *supra* note 400, at 146 ("A decision tree could conceivably track the factors identified by the Copyright Act and big three fair use judicial decisions . . . The tree would be reliable if it produced leaf nodes with reliable classification.")

483. See Guidotti, *supra* note 39, at 13–14.

484. See *id.* at 13.

485. See *id.* at 13–14.

486. Guest Contributor, *Why DeepMind AlphaGo Zero is a Game Changer for AI Research*, PACKT (May 9, 2019), <https://hub.packtpub.com/deepmind-alphago-zero-game-changer-for-ai-research/#:~:text=AlphaGo%20Zero's%20strategies%20were%20self,lesser%20processing%20power%20than%20AlphaGo.>

487. See McJohn & McJohn, *supra* note 400, at 147 ("If machine learning could produce a reliable decision tree for fair use, then, it would have perfect transparency.")

488. GÉRON, *supra* note 343, at 181.

or explore already-explored sequences more deeply.⁴⁸⁹ The algorithm can constantly be made smarter by performing MCTS-based lookahead and use the results of that lookahead to upgrade the agent, allowing the algorithm to improve even when data may be scarce, an issue which Part IIIB explores in more detail.

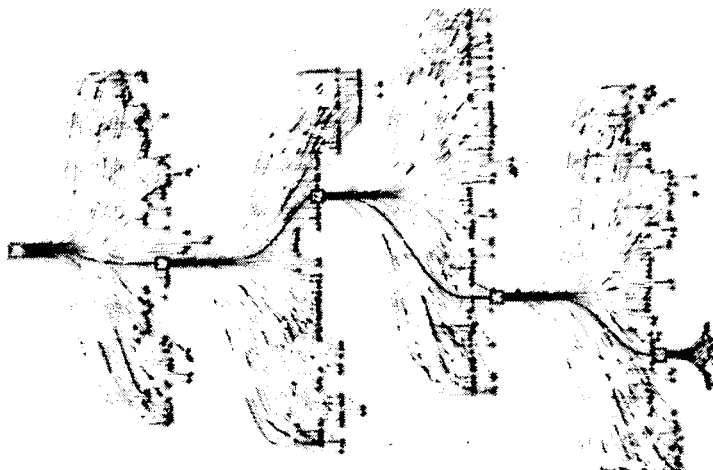


Figure 4: A Monte Carlo Tree Search⁴⁹⁰

The rule of reason also follows a logical sequence, allowing each step to be coded, disaggregated, and individually assessed by courts and data scientists. As the algorithm sorts through the data, decision trees can analyze and predict whether the facts lean toward a case being anticompetitive, qualifying predictions with a probability than other cases sharing similar attributes. Once the algorithm generates a decision tree forest, all the trees' average gives a probability for the outcome. Even as far back as 2004, decision tree analysis outperformed predicting affirmance rates than a panel of legal experts.⁴⁹¹

Decision trees can also provide courts with the ability to assess consumer welfare and counterfactuals parties present to the court.⁴⁹² For instance, in 2017, Vanderbilt University and Florida State University used a decision tree algorithm to study suicide

489. See Guest Contributor, *supra* note 486.

490. *Id.*

491. Andrew D. Martin et al., *Competing Approaches to Predicting Supreme Court Decision Making*, 2 PERSPS. ON POLS. 761 (2004).

492. See Guidotti, *supra* note 39, at 21.

predictions.⁴⁹³ The researchers used a dataset of 5,000 patients with a history of self-injury to predict, based on 1,300 different characteristics.⁴⁹⁴ They determined the likelihood patients would commit suicide based on age, gender, and various aspects of their medical histories.⁴⁹⁵ When tested against real-world outcomes, if the algorithm predicted that a person had a fifty-percent chance or higher of committing suicide, they did seventy-nine percent of the time.⁴⁹⁶ When the algorithm predicted the chances were less than 50%, it only happened 5% of the time.⁴⁹⁷

As with any tool, decision trees have their limitations. Compared to other AI techniques, they have relatively high data demands since good predictions require many different trees to deliver a statistically significant average from them all,⁴⁹⁸ variations in the training data can skew results. Data scientists may need to preprocess the training data by tagging or finding attributes by clustering or other approaches.⁴⁹⁹ They are also less effective when fed with images or text, but only to tabular, relational data, and may require preprocessing.⁵⁰⁰

To complement techniques like decision trees, an open governance structure that allows some audit of the underlying algorithms and datasets will also be critical to accountability. Open governance frameworks can prospectively benchmark AI tools by reserving a random hold-out sample of cases for judges to decide, providing critical information to smoke out when an algorithm has gone astray or “automation bias” has led decision-makers excessively to defer to an algorithm.⁵⁰¹ For example, in the European Union, dominant tech companies must soon explain how their algorithms work and open up ad archives to both regulators and researchers to shed light on how these algorithms work and make sure that companies are accountable for their decisions.⁵⁰² Likewise, algorithms used in antitrust

493. Colin G. Walsh et al., *Predicting Risk of Suicide Attempts Over Time Through Machine Learning*, 5 CLINICAL PSYCH. SCI. 457 (2017), <https://journals.sagepub.com/doi/suppl/10.1177/2167702617691560>.

494. *Id.*

495. *Id.*

496. *Id.*

497. *Id.*

498. McJohn & McJohn, *supra* note 400, at 148 (“decision tree, compared to other algorithms, is more demanding in the form of data on which it can operate.”).

499. *Id.*

500. See Guidotti, *supra* note 39, at 13.

501. See Engstrom et al., *supra* note 324, at 7.

502. *Big Tech Will Have to Explain Their Algorithms Under New EU Rule*, CPI (Nov. 1, 2020), <https://www.competitionpolicyinternational.com/big-tech-will-have-to-explain-their-algorithms-under-new-eu-rule/>.

adjudication must also be subject to audits to ensure they are accountable, if not transparent, within reasonable limits.

Done well, algocracy will help minimize biases from human decision-making without compounding those biases with its own.⁵⁰³ In the years ahead, ethics teams will likely become an essential department in antitrust agencies and economic consultancies such as finance, legal, marketing, and human resource departments. These teams can help decision-makers weigh benefits and harms of AI procedures and recommendations, flag their implications, develop guidelines, and help clarify ethical conflicts.⁵⁰⁴

Finally, technological progress will increasingly minimize tradeoffs between accountability and efficacy. In 2021, MIT researchers developed flexible algorithms that learn on the job.⁵⁰⁵ Dubbed “liquid” networks, they change underlying equations to adapt to new data inputs continuously.⁵⁰⁶ This advance could aid decision-making based on data streams that change over time, so they do in many of the dynamic markets antitrust governs.⁵⁰⁷ Moreover, the network is more interpretable by changing the representation of a neuron with differential equations, and data scientists can explore complexity not found in other more sophisticated algorithms. These expressive neurons make it easier to peer into the “black box” of the network’s decision-making and determine why it made a recommendation.⁵⁰⁸

In sum, AI can chart antitrust law over time and help covert the rule of reason into a more transparent rules-based system. In so doing, AI introduces more predictability and clarity into the rule of reason analysis that will help compliance and refinement of those rules. Rules-based systems operate using explicit, pre-defined criteria that are not necessarily executed in a specified order. Explicit rules help determine the criteria they use to make decisions. Judges adjudicating using AI can help provide checklists to delineate prohibited and permitted conduct, making compliance less a leap of “hunch, faith, and intuition” and empowering businesses who depend on clear rules to confidently make informed decisions.

503. See Ryan, *supra* note 453, at 281–87.

504. Lim & Chan, *supra* note 45.

505. Daniel Ackerman, *MIT’s New Neural Network: “Liquid” Machine-Learning System Adapts to Changing Conditions*, SCITECHDAILY (Feb. 2, 2021), <https://scitechdaily.com/mits-new-neural-network-liquid-machine-learning-system-adapts-to-changing-conditions/>.

506. *Id.*

507. *Id.*

508. *Id.*

B. Data Scarcity

The impressive results we often read about in AI rests on the massive data sets data scientists use to train them. Finding sufficient usable data is key to antitrust's algorithmic revolution.⁵⁰⁹ To achieve "acceptable performance," data scientists estimate that a dataset typically requires ten million labeled examples to match or exceed human performance.⁵¹⁰ Overlapping with the earlier discussion, data scarcity may give rise to bias, which occurs when the dataset is underinclusive or when the dataset captures an under-representative sample of all the antitrust violations that do occur.⁵¹¹

Datasets used in the law are comparatively scarcer than pictures of dogs, handwriting samples, or chess games used to train image classifiers because they are more variegated and not all presented in the same format. Antitrust evidence comprises of case law, market data, expert opinions, and the like. Documents may not be in a machine-readable format or require pre-processing. The law itself may also limit collection, storage, and data use, such as those governing data protection and privacy. Data can also be challenging to find because individuals who do not directly benefit from providing it must cooperate and may not provide it for fear of being implicated. In this regard, extending existing antitrust leniency programs to cover data provision would help address these concerns. Addressing data scarcity is complex, but it can be done by focusing on two key principles.

First, the perfect is the enemy of the good. Westlaw reveals that between 1920 and 2020, there are over 10,000 reported antitrust decisions from the district courts, circuit courts of appeal, and the Supreme Court.⁵¹² Compared to a textbook example of image classification datasets with 60,000 images, at first glance, 10,000 may seem small.⁵¹³ However, each case contains dozens, if not hundreds, of variables that algorithms can parse through and map. The total number of datapoints is therefore many times more than 10,000.

509. McJohn & McJohn, *supra* note 400, at 139 ("Perhaps the greatest difficulty in applying machine learning to the domain of law, as discussed above, is the need for sufficient data and for that data to come in a form amenable to the various techniques of machine learning.")

510. GOODFELLOW ET AL., *supra* note 298, at 26.

511. See GÉRON, *supra* note 343, at 22–23.

512. Based on a Westlaw search by "Cases by Topic" for cases between January 1, 1901 and December 31, 2020.

513. Abdellatif Abdelfattah, *Image Classification Using Deep Neural Networks*, MEDIUM (July 27, 2017), <https://medium.com/@tifa2up/image-classification-using-deep-neural-networks-a-beginner-friendly-approach-using-tensorflow-94b0a090ccd4>.

Moreover, compared to other standards-based areas of the law that scholars have presented for AI adjudication, such as fair use, which has a few hundred reported cases over a similar period, antitrust is a more promising candidate.⁵¹⁴ The algorithm might not recognize anticompetitive conduct with the same level of accuracy as it does with dog pictures. Still, it would be a superior alternative to adjudicating the rule of reason based on human cognition's frailties alone.

Second, AI itself can ameliorate data scarcity. Deep learning generates other examples via dataset augmentation once it has learned to identify features, akin to the Socratic approach of lightly modifying hypotheticals. Consider how IBM's Deep Blue relied on learning using many thousands of human-played games as examples.⁵¹⁵ In contrast, AlphaZero needed no more than the chess rules and generated its example games to augment its dataset.⁵¹⁶ Like AlphaZero, Amazon's algorithms predict a buyer's preferences by finding another browser with the most similar viewing history and then offering the item the second browser liked.⁵¹⁷ This searching obviates both the need for enormous datasets and the need to train them.

Data scientists program AI to generate multiple examples by randomly altering salient factors the same way they augment image datasets with random translations, rotations, and in some cases, flips of the input, evoking Socratic principles, where professors altered hypotheticals to train their students' ability to identify facts and legal concepts within the source material.⁵¹⁸ Thus, machine learning allows one dataset to be made into many different datasets through resampling—creating new datasets that randomly exclude some of the data. In the Vanderbilt-Florida State study, to create a “new” dataset through resampling, the researchers randomly selected one person out of the full dataset of 5,000 people, 5,000 times.⁵¹⁹ The same person can be selected more than once. Probability means the

514. See McJohn & McJohn, *supra* note 400, at 120 (“There are hundreds of reported judicial opinions on fair use.”).

515. See generally David Silver et al., *A General Reinforcement Learning Algorithm That Masters Chess, Shogi, and Go Through Self-Play*, 362 *SCI*.1140 (Dec. 7, 2018).

516. *Id.*

517. Amazon Web Services, *What is Artificial Intelligence?*, <https://aws.amazon.com/machine-learning/what-is-ai/> (last visited May 16, 2022) (“[A]lgorithms can now identify the items that might interest you by examining your past purchases or product visits, and comparing that information to that of others.”).

518. GOODFELLOW ET AL., *supra* note 298, at 459–60 (“Machine learning itself may generate additional examples.”).

519. See generally Walsh, *supra* note 493.

resampled dataset would only use around 3,200 of the 5,000 people in the source dataset; 1,800 people would not get randomly selected.⁵²⁰ With their resampled dataset, the researchers can generate a new decision tree, which is likely to be slightly different from using the original data.

Like machine learning algorithms, the law relies on analogies. Judges could use the “nearest neighbor” algorithm to search a database of examples to find the most similar case that had been held to violate antitrust law.⁵²¹ The outcome is not a legal analysis but rather a prediction, with an acceptable level of accuracy, whether a restraint in a specific factual context would violate antitrust law.⁵²² It is particularly useful in rule of reason cases, which are resistant to general characterization and finding a close match case may often answer an issue satisfactorily.⁵²³ They could annotate cases automatically to provide a common data structure, as has been done for veterans’ claims for disability compensation,⁵²⁴ as well as contract drafting and interpretation.⁵²⁵

Algorithms like these are particularly useful in helping firms with compliance efforts or courts with pretrial motions. “Nearest neighbor” algorithms require no time training once the software is written⁵²⁶ and requires no general model about what is or is not illegal because it only requires the closest match where examples closest to the test example carry more weight.⁵²⁷ Once the deep learning algorithm can identify features (such as concepts or taxonomies), then a generative model can produce new, different examples sharing the same features but in a different arrangement.

520. *Id.*

521. See McJohn & McJohn, *supra* note 400, at 142–43 (“The technique also does not require the enormous datasets on which the most sophisticated neural networks rely. . . . Nearest neighbor could be used in such a way that relevant features were chosen at run time and so used as a research tool or otherwise to find related precedent.”).

522. See GÉRON, *supra* note 343, at 23.

523. See McJohn & McJohn, *supra* note 400, at 142 (“An advantage of nearest neighbor is the savings in training a network (or using it where training a network would be impracticable).”).

524. See, e.g., Vern R. Walker et al., *Semantic Types for Computational Legal Reasoning: Propositional Connectives and Sentence Roles in the Veterans' Claims Dataset*, in SIXTEENTH INTERNATIONAL CONFERENCE ON ARTIFICIAL INTELLIGENCE AND LAW 217, 217–26 (2017).

525. See Kathryn D. Betts & Kyle R. Jaep, *The Dawn of Fully Automated Contract Drafting: Machine Learning Breathes New Life into a Decades-Old Promise*, 15 DUKE L. & TECH. REV. 216, 227 (2017).

526. See DOMINGOS, *supra* note 344, at 179–86.

527. *Id.* at 183.

These datasets can also exclude outliers and resample the data to minimize ideological skews unsupported by data. In the Vanderbilt-Florida state study, researchers generated five hundred different decision trees.⁵²⁸ Since the algorithm does all the work, researchers can make thousands of trees or even millions and use unsupervised machine learning techniques to find clusters used as examples that another algorithm can use to learn to classify conceptually linked groups. And since the rule of reason depends on finding similarities between fact patterns, rather than identifying each feature independently, features can be clustered and annotated by a set of shared attributes to provide a standard data structure. One downside to the “nearest neighbor” algorithm is that it requires preprocessing the data to focus on discrete and relatively small features to compare to avoid the algorithm having to scour the entire database to compare every salient feature exhaustively.⁵²⁹ Despite this limitation, its many upsides make it a candidate for serious consideration.

In sum, bias, accountability, and data availability are well-known concerns with AI deployment. While legitimate, each can be significantly mitigated or, in some cases, comprehensively addressed. If successful, algorithmic antitrust will have important implications that will reverberate beyond merely fixing Chicago’s overreach. It will revolutionize antitrust adjudication, help correct systemic bias against plaintiffs, and serve as a useful case study to many other standards-based areas of the law.

IV. BROADER REFLECTIONS ON COMMON THEMES

This Part concludes the discussion by reflecting on the broader implications of algorithmic adjudication beyond antitrust law by discussing atextualism in action, algocracy and the common law, and the implications of plaintiff success to the rule of law.

A. Atextualism in Action

Antitrust law is perhaps the only area where an unelected judiciary makes the law in systemic defiance of democratic norms.⁵³⁰ The Sherman Act is an example of what Professors Eskridge and Frerejohn called a “super-statute” establishing “a new normative or institutional framework for state policy.”⁵³¹ This state policy involves

528. Walsh, *supra* note 493, at 460.

529. *Id.* at 461.

530. First & Waller, *supra* note 198, at 2544–46 (criticizing the shift of antitrust away from its democratic roots).

531. *Leegin Creative Leather Products, Inc. v. PSKS, Inc.*, 551 U.S. 877 (2007)

a common method of adapting statute law to meet challenges by heterogeneous fact patterns.⁵³² What has filled the statutory void is a fluid meta-conversation between the judges, agencies, attorneys, academics, and Congress about the nature and purpose of antitrust law.⁵³³

Liberal and conservative judges agree common law decision-making trumps statutory interpretation, diverging only on how to steer that common law reasoning to port.⁵³⁴ Professors Farber and McDonnell observed that even the most ardent judicial textualists display “casual disregard” for antitrust legislation,⁵³⁵ and Professor Oldman noted that in antitrust law, judges do not simply fill statutory gaps but have “violat[ed] every conceivable canon of statutory interpretation” along the way.⁵³⁶

Surprisingly, liberal judges sometimes apply antitrust law conservatively, and conservative judges do the opposite. For example, in one case, Justice Scalia argued for the “dynamic potential” of the common law since the Sherman Act invokes “the common law itself, and not merely the static content that the common law had assigned to the term in 1890.”⁵³⁷ In contrast, Justice Stevens argued for the Sherman Act to be interpreted “in light of its common law background,” mapping pre-Sherman Act common law cases to the facts before them.⁵³⁸

The tensions within antitrust law reflect a broader phenomenon non-existent a few decades ago. Areas once thought to be outside the courts’ responsibility, such as foreign policy or military force, are the courts’ issues.⁵³⁹ One possibility is that the sheer complexity of

(“From the beginning the Court has treated the Sherman Act as a common-law statute. . . . Just as the common law adapts to modern understanding and greater experience, so too does the Sherman Act’s prohibition on ‘restraint[s] of trade’ evolve to meet the dynamics of present economic conditions.”). See also Eskridge & Ferejohn, *supra* note 72.

532. Eskridge & Ferejohn, *supra* note 72, at 1234.

533. *Id.* at 1232.

534. See, e.g., *Bus. Elec. Corp. v. Sharp Elec. Corp.*, 485 U.S. 717 (1988) (Scalia for the majority, Stevens for the dissent); Crane, *supra* note 67, at 1211 (“[I]n antitrust cases, neither the conservatives nor progressives on the Court place any stock in conventional contests over statutory interpretation methodology, accepting instead common law methodology as their battleground.”).

535. Farber & McDonnell, *supra* note 14, at 621.

536. Andrew S. Oldham, *Sherman’s March (In)to the Sea*, 74 TENN. L. REV. 319, 321 (2007).

537. *Business Elec. Corp.*, 485 U.S. at 732.

538. *Id.* at 736.

539. Jonathan Eyal, *Global Affairs: Why Judges Are Becoming More Powerful*, THE STRAITS TIMES (Sept. 30, 2019), <https://www.straitstimes.com/opinion/global-affairs-why-judges-are-becoming-more-powerful>.

regulating life in a modern state means unelected judges must make political choices. Another possibility is the unwillingness to let the political branches make decisions and the resulting anti-regulatory hostility that may manifest as judicial activism.

In either case, how judges do so in antitrust law raises important normative questions about statutory interpretation and the extent that other statutory domains exhibit similarly unappreciated dynamics.⁵⁴⁰ Delving within the folds in the law provides a more nuanced understanding of how Congress writes statutes and how courts interpret them. The discovery of new patterns of interpretation and judicial activism or passivity in other areas of the law could provide new insights into statutory interpretation, the separation of powers, the roles of the legislative and judicial branches in antitrust law, each adding to new insights into legal realism in action.⁵⁴¹

B. Algocracy and the Common Law

AI tools discussed in this Article are powerful analytic methods that can help make the rule of reason more efficient, effective, and predictable. The Supreme Court underscored predictability as a “fundamental principle in our legal system,” recognizing “that laws which regulate persons or entities must give fair notice of conduct that is forbidden or required.”⁵⁴² Yet antitrust law fails to provide predictability to its stakeholders. Ad hoc adjudication makes it hard to institutionalize the very rules courts need to make adjudication less ad hoc. In AI jargon, this approach results in “overfitting” and precludes judges from generalizing past cases to guide new circumstances.⁵⁴³ Institutionally, this systemic flaw stunts the usefulness of precedents, in turn upending the common law method’s purpose and reinforces Chicagoans’ skepticism about the relevance of antitrust law as a means of market regulation.⁵⁴⁴

540. Crane, *supra* note 67, at 1254 (“Once a pattern is observed in one legal domain, it tends to be observed soon in others as well.”).

541. See, e.g., Brian Leiter, *Legal Formalism and Legal Realism: What Is the Issue?*, 16 LEGAL THEORY 111 (2010).

542. FCC v. Fox Television Stations, 567 U.S. 239, 253 (2012); see also *Boyce Motor Lines, Inc. v. United States*, 342 U.S. 337 (1952) (holding that no more than a reasonable degree of certainty can be demanded in the language of the prohibition contained in a criminal statute, and it is not unfair to require that one who deliberately goes perilously close to an area of proscribed conduct shall take the risk that he may cross the line).

543. See DOMINGOS, *supra* note 344, at 73.

544. See Woodcock, *supra* note 55, at 57 (“The ambiguous and unlikelike character of the consumer welfare standard has fed Chicago School skepticism about the usefulness of the antitrust laws.”).

Algorithmic antitrust may solve many of these problems, but it may create new ones in the process. Like the ever-expanding menu of government applications that perform enforcement and adjudication tasks, new algorithmic governance tools can strengthen the state's coercive power.⁵⁴⁵ Algocracy, or fully automated decision-making, has the corollary of leaving progressively less discretion to judges, and in some cases, displacing them entirely.⁵⁴⁶ Even as we embrace technology, we must be wary that it does not enslave us. AI can help to identify the value judgments but not to decide whether they are good ones. These are normative judgments and will remain in the realm of the discretion of human judges—at least for now.⁵⁴⁷

Future research could explore establishing internal and external auditing processes, establishing an algorithmic ombudsman, and other regulatory bodies. Scholars could also address important questions beyond this Article's scope, including whether acquisitions and other corporate transactions would become more complicated if we cannot fully explain how algorithms make predictions. And how should human judges and machines make those decisions together? Who resolves conflicts between the two? These concerns extend beyond algorithmic antitrust, and there needs to be a wider participatory process that allows stakeholders to weigh in.⁵⁴⁸

Another point relates to fairness. Like antitrust itself, AI cannot deliver fairness, except in the broadest sense of the work.⁵⁴⁹ Transparency, while less demanding than fairness, may only be a little more attainable.⁵⁵⁰ As Nachbar argues, “[e]ven if there were universal agreement on what fairness requires, the *law* is not generally interested in fairness, preferring instead to prohibit certain

545. See Frank Pasquale, *Restoring Transparency to Automated Authority*, 9 J. TELECOMM. & HIGH TECH. L. 235, 235–36 (2011).

546. See Danielle Keats Citron, *Technological Due Process*, 85 WASH. U. L. REV. 1249, 1259 (2008).

547. See generally Lim, *supra* note 88.

548. See David Fontana, *Reforming the Administrative Procedure Act: Democracy Index Rulemaking*, 74 FORDHAM L. REV. 81, 102–03 (2005) (observing that greater public participation in notice-and-comment rulemaking can generate greater public support for the rule that the process ultimately delivers).

549. See Nachbar, *supra* note 269, at 526 (“There is no system in which fairness itself is the principal goal, only systems with other principal goals on which fairness operates.”); Fredrick Schauer, *The Annoying Constitution: Implications for the Allocation of Interpretive Authority*, 58 WM. & MARY L. REV. 1689, 1693–94 (2017) (adapting rights-based side constraints in service of higher order institutional design rather than individual rights).

550. Nachbar, *supra* note 269, at 517 (“[E]ven if computer science could accommodate a coded form of fairness, it’s not clear that either fairness itself or law could.”).

forms of unfairness.”⁵⁵¹ As AI continues to permeate legal practice, the task of addressing algocracy and the delegation of judicial discretion in areas like antitrust that are largely shaped by common law will become ever more urgent.

C. Saving the Plaintiff

Professors Andrew Gavil and Steven Salop observed:

[Chicago’s] goal of preventing false positives provided a focus for the comparative evaluation of alternative legal rules, and became a barometer for measuring the scope of antitrust prohibitions. This translated into a call for a higher evidentiary burden on plaintiffs in cases alleging exclusionary conduct, which included a requirement of more economic evidence to support competitive harm allegations.⁵⁵²

Of course, plaintiffs should not have a reasonable chance of succeeding on meritless claims. While Chicago overcorrected, neither Harvard, nor Post-Chicago, nor Neo-Brandeisian antitrust offers a practical path by which plaintiffs can prove cases that have merit. When the numbers show steep declines in their win rates in areas such as substantial similarity not seen elsewhere, the civil justice system must be alert in examining and addressing the causes.⁵⁵³

Like antitrust plaintiffs, plaintiffs elsewhere face systemic biases that AI may help address. Consider how in a breach of contract suit, plaintiffs must cumulatively show a valid contract that imposes a duty on defendants to act or refrain from acting, and defendants breached their duty in a way that harmed them.⁵⁵⁴ By comparison, defendants can rebut each element in multiple ways.⁵⁵⁵ The procedural asymmetry between plaintiffs and defendants translates into plaintiffs expending resources to establish each element of their cause of action, while defendants focus on a single ground to defend.⁵⁵⁶ Plaintiffs face rigorous scrutiny in their attempt to vindicate their rights.⁵⁵⁷

551. *Id.*

552. Gavil & Salop, *supra* note 248, at 5–6.

553. *Id.*

554. *See, e.g.*, Oasis West Realty, LLC v. Goldman, 250 P.3d 1115, 1121 (Cal. 2011).

555. *See generally*, E. ALLAN FARNSWORTH ET AL, CONTRACTS (8th ed. 2013).

556. *See generally id.*

557. *See generally id.*

Rights and duties form the foundation of the American legal system.⁵⁵⁸ These include freedom, bodily integrity, property interests, and concomitant obligations that third parties must adhere to.⁵⁵⁹ However, rights are not self-enforcing, and rights-holders must have a credible legal means of vindicating them to have any meaning. Work by Professors Gideon Parchomovsky and Alex Stein shows that the “best way to realize the goals of compensation and deterrence is to enable victims to pursue individual justice against those who wronged them.”⁵⁶⁰ Class actions can deter wrongdoing but provide limited compensation for the wrongdoings’ victims.⁵⁶¹ Compensation funds also recompense victims but do little to prevent future wrongs.⁵⁶²

Plaintiffs are indispensable to our legal system. They play a pivotal role in exposing misconduct and help the copyright system achieve its policy goals. Erase any meaningful chance of success, and the checks against behavior that stifles market competition will stumble and collapse. Antitrust’s AI revolution will give plaintiffs a better basis to overcome Chicagoan misgivings to prove improper, actionable infringement of antitrust law. It may assist others further afield as well. Restoring a reasonable chance of succeeding in litigation to plaintiffs helps preserve public trust in the law, and it is the right thing to do.

CONCLUSION

This Article provides the manifesto on harnessing the power of AI to redesign antitrust adjudication in the years to come. Algorithmic antitrust has immense potential for revolutionizing every aspect of doctrine, policy, and practice. The discussion contained herein makes three important contributions to the literature. First, it explains the roots of antitrust’s indeterminacy and systemic bias against plaintiffs. Congress intended antitrust statutes to be expressive and for courts to treat them as such.⁵⁶³ Understanding antitrust’s common-law roots help explain why AI provides the breakthrough. Second, as a forensic

558. See Wesley Newcomb Hohfeld, *Some Fundamental Legal Conceptions as Applied in Judicial Reasoning*, 23 YALE L.J. 16, 28 (1913).

559. *Id.* at 20–25, 28–32 (distinguishing legal and non-legal interests).

560. Gideon Parchomovsky & Alex Stein, *Empowering Individual Plaintiffs*, 102 CORNELL L. REV. 1319, 1325 (2017) (“Lawsuits by individual victims are unique in that they constitute the only litigation form that simultaneously advances the twin goals of deterring wrongdoers and compensating victims.”).

561. *Id.* at 1352 (“class actions systematically fail to compensate individual plaintiffs for their losses.”).

562. *Id.* at 1325.

563. See generally, Jesse M. Cross, *When Courts Should Ignore Statutory Text*, 26 GEO. MASON L. REV. 453 (2018).

and predictive tool, AI enables courts to dampen ideological swings, make sense of the complex, dynamic, and fast-moving licensing markets many businesses operate in and harness its ability to model price and innovation effects more precisely. Third, it identifies and addresses key challenges to implementing AI: data accountability, data availability, and data bias.

Using AI to help adjudicate antitrust law may sound arcane or prosaic. In fact, it is revolutionary. The arc of its history shows antitrust law's inherent vulnerability to ideology stampeding facts, law, and data. Current approaches are fundamentally backward-looking and have no effective means of dealing with these symptoms. Few have recognized, much less captured in any substantial detail, the breadth and depth of transformation that AI can bring antitrust adjudication. This new approach presents a new normative paradigm to replace Chicagoan fears of judicial inaptitude and false positives with a truly evidence-based alternative, particularly when dealing with cases involving nascent acquisitions and intellectual property rights. With all that is stake in getting antitrust analysis right, the task at hand is both urgent and immensely important. The time for AI's antitrust revolution is now.