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# AI AND INTERDEPENDENT PRICING: COMBINATION WITHOUT CONSPIRACY?

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# AI AND INTERDEPENDENT PRICING: COMBINATION WITHOUT CONSPIRACY?

Joshua P. Davis & Anupama K. Reddy<sup>1</sup>

## I. INTRODUCTION

Artificial Intelligence (AI) holds the potential to change our landscape in many ways. Some of them are positive. AI may empower automobiles to drive themselves, greatly reducing traffic accidents<sup>2</sup> and freeing up our time to pursue other tasks. It may be able to detect cancer—or its absence—far better than radiologists can, saving lives and avoiding unnecessary surgeries.<sup>3</sup> It can help us to identify remedies for viruses and perhaps greatly accelerate our development of vaccines. The list goes on and on.

But AI also has the potential to cause great harm. One place that harm may take place is in the marketplace. AI is a great player of games. It has defeated the world chess champion.<sup>4</sup> It has done the same to the world champion of Go,<sup>5</sup> a game with even more permutations. Market participants may be able to harness AI's game-playing power to cause market distortions to their benefit. That possibility and how to deal with it are the topics of this article.

More specifically, this article will address civil liability for interdependent pricing<sup>6</sup> without an agreement as facilitated by AI. There is perhaps no area of greater consensus in antitrust law—and

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<sup>2</sup> See John Markoff, *Google Cars Drive Themselves, in Traffic*, N.Y. TIMES, October 9, 2010, available at <https://www.nytimes.com/2010/10/10/science/10google.html?mcubz=1%20> (“Robot drivers react faster than humans, have 360-degree perception and do not get distracted, sleepy or intoxicated, the engineers argue.”).

<sup>3</sup> See, e.g., Sy Mukherjee, *This New AI Can Detect a Deadly Cancer Early With 86% Accuracy*, FORTUNE, Oct. 30, 2017, available at <http://fortune.com/2017/10/30/ai-early-cancer-detection/>; Riverrain Med., U.S. FDA Approves Improved Performance of OnGuard Chest X-Ray CAD Technology, MEDICEXCHANGE June 24, 2010, available at <https://www.prnewswire.com/news-releases/us-fda-approves-improved-performance-of-riverrain-medicals-onguard-chest-x-ray-computer-aided-detection-technology-96787199.html>; Gigen Mammoser, *AI May Be Better at Detecting Skin Cancer Than Your Derm*, HEALTHLINE, June 19, 2018, available at <https://www.healthline.com/health-news/ai-may-be-better-at-detecting-skin-cancer-than-your-derm#1>.

<sup>4</sup> See Matt McFarland, *Google Just Mastered a Game That Vexed Scientists—and Their Machines—for Decades*, WASHINGTON POST, January 27, 2016, available at <https://www.washingtonpost.com/news/innovations/wp/2016/01/27/google-just-mastered-a-game-thats-vexed-scientists-for-decades/>.

<sup>5</sup> See Scott Santens, *Robots Will Take Your Job*, BOSTON GLOBE, Feb. 24, 2016, available at <https://www.bostonglobe.com/ideas/2016/02/24/robots-will-take-your-job/5lXtKomQ7uQBEzTJOXT7YO/story.html>.

<sup>6</sup> See, e.g., *Clamp-All Corp. v. Cast Iron Soil Pipe Inst.*, 851 F.2d 478, 484 (1st Cir. 1988) (interdependent pricing is lawful “not because such pricing is desirable (it is not), but because it is close to impossible

competition law more generally—than that competing sellers should not be permitted to agree to elevate their prices above competitive levels.<sup>7</sup> Doing so is a crime in the U.S., as well as conduct that is treated as *per se* illegal under our civil antitrust laws.<sup>8</sup>

In contrast, courts often hold that the law allows sellers to act independently in a way that approximates—or even replicates—the effects of a price-fixing conspiracy.<sup>9</sup> Particularly when there are only a small number of sellers in a market, they may all manage to charge prices above competitive levels. True, each one could gain market share by lowering its prices. But the others would likely respond in kind—that is, retaliate—and the ultimate result would be to decrease all of their profits. So they might each price at levels similar to a monopolist and none may break ranks, benefiting all of them. This approach is sometimes called “interdependent pricing” because the strategy works for one seller only if other sellers respond in kind; the pricing strategy of each seller depends on the pricing strategies of the others. The same conduct is also sometimes called “conscious parallelism.”<sup>10</sup>

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to devise a judicially enforceable remedy for ‘interdependent’ pricing. How does one order a firm to set its prices without regard to the likely reactions of its competitors?”).

<sup>7</sup> An analogous rule applies to buyers. They cannot conspire to reduce the prices they pay below competitive levels. But that is not perceived to occur as often as conspiracies among sellers and so this article will focus on sellers’ conduct.

<sup>8</sup> In *U.S. v. Socony-Vacuum Oil Co.*, the Supreme Court stated that “a combination [of competitors] formed for the purpose and with the effect of raising, depressing, fixing, pegging, or stabilizing the price of a commodity in interstate or foreign commerce is illegal *per se*.” 310 U.S. 150, 218 (1940).

<sup>9</sup> See e.g., *Brooke Grp. Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 227 (1993) (“Tacit collusion, sometimes called oligopolistic price coordination or conscious parallelism, describes 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.”). See also *Motorola Mobility LLC v. AU Optronics Corp.*, 775 F.3d 816, 822 (7th Cir. 2014) (dictum) (Posner, J.) (stating if rivals were to match a slight price increase, it would “be an example of tacit collusion, which is not an antitrust violation”); *White v. R.M. Packer Co.*, 635 F.3d 571, 576 n.3 (1st Cir. 2011) (“Conscious parallelism has also been called ‘tacit collusion’ or ‘oligopolistic price coordination.’”) (citing *Brooke Group*, 509 U.S. at 227); *In re Insurance Brokerage Antitrust Litig.*, 618 F.3d 300, 339 n.19 (3d Cir. 2010); *Bailey v. Allgas, Inc.*, 284 F.3d 1237, 1251 (11th Cir. 2002) (“The hallmark of an oligopoly is tacit collusion among competitors.”); *Bell Atl. Corp. v. Twombly*, 550 U.S. 544, 554 (2007) (“The inadequacy of showing parallel conduct or interdependence, without more, mirrors the ambiguity of the behavior: consistent with conspiracy, but just as much in line with a wide swath of rational and competitive business strategy unilaterally prompted by common perceptions of the market.”).

<sup>10</sup> See Barak Orbach, *Interstate Circuit and Conspiracy Theories*, 2019 U. ILL. L. REV. 1447, 1487 (2019) (“‘Conscious parallelism’ means interdependence that results in parallel conduct”); see also Donald F. Turner, *The Definition of Agreement Under the Sherman Act: Conscious Parallelism and Refusals to Deal*, 75 HARV. L. REV. 655, 671 (1962) (“[O]ligopolists who take into account the probable reactions of competitors in setting their basic prices, without more in the way of ‘agreement’ than is found in ‘conscious parallelism,’ should not be held unlawful conspirators under the Sherman Act even though . . . they refrain from competing in price.”).

Interdependent pricing can cause the same kinds of harms as price-fixing conspiracies.<sup>11</sup> It transfers wealth from buyers to sellers, decreases output, and results in deadweight loss (sales of a product or service that fail to occur because prices are elevated above competitive levels). How significant these harms are depends on which notion of efficiency one adopts. A focus on consumer welfare would include all of those effects as significantly harmful.<sup>12</sup> In contrast, a focus on total welfare might suggest that a wealth transfer from a buyer to a seller—all else equal—is not necessarily bad. Regardless, there is general agreement that interdependent pricing, to the extent it has the same consequences as a price-fixing agreement, is anticompetitive.

Where there is far less agreement is whether the law should prohibit interdependent pricing as it does price-fixing agreements and, relatedly, how to draw the line between the two. In principle, an agreement to fix prices is illegal while independent conduct that has the same effect is not. But it is difficult to articulate how to distinguish them, if they are in fact distinct, a problem made more challenging in practice by various legal doctrines. One of them allows plaintiffs to rely on circumstantial evidence<sup>13</sup> to establish the existence of an agreement and another recognizes tacit agreements as sufficing for liability. In part because of similarities in effects, and the difficulties of line-drawing, theorists have suggested at times that the law should condemn interdependent pricing as it does price fixing. Richard Posner endorsed that approach over five decades ago,<sup>14</sup> although, as he has acknowledged, he was not alone in doing so and he has since changed his mind.<sup>15</sup> Louis Kaplow recently wrote an excellent book offering reasons to believe Posner may have been right in the first place and may be wrong now—a policy conclusion, he concedes, that “must be viewed as quite tentative.”<sup>16</sup>

The thrust of Kaplow’s argument is that from an economic perspective what we care about is whether prices are elevated above competitive levels, not the communications that we often require to prove the existence of an agreement.<sup>17</sup> As a result, requiring a conspiracy can end up focusing

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<sup>11</sup> See Louis Kaplow, *On the Meaning of Horizontal Agreements in Competition Law*, 99 CAL. L. REV. 683, 811-12 (2011); see also Elmer J. Schaefer, *Basing-Point Pricing Establishes Illegal Vertical Agreements*, 18 GA. L. REV. 529, 535 (1984) (“If successful, conscious parallelism based on implicit price signaling creates the same harm as an explicit agreement to fix prices.”); Lee Goldman, *Trouble for Private Enforcement of the Sherman Act: Twombly, Pleading Standards, and the Oligopoly Problem*, 2008 B.Y.U. L. REV. 1057, 1057 (2008) (“Although interdependent pricing results in the same harm to competitors as an agreement to fix prices, it is clear that the latter is per se illegal and the former, lacking a viable remedy, is legal.”)

<sup>12</sup> See Kaplow, *supra* note 11 at 811-12; see also Louis Kaplow, *An Economic Approach to Price Fixing*, 77 ANTITRUST L.J. 343, 353 (2011).

<sup>13</sup> *Interstate Circuit v. U.S.*, 306 U.S. 208 (1939).

<sup>14</sup> Richard A. Posner, *Oligopoly and the Antitrust Laws: A Suggested Approach*, 21 STAN. L. REV. 1562 (1969).

<sup>15</sup> Richard A. Posner, *Review of Kaplow, Competition Policy and Price Fixing*, 79 ANTITRUST L. J. 761 (2014).

<sup>16</sup> Louis Kaplow, *COMPETITION POLICY AND PRICE FIXING* 451 (Princeton University Press 2013).

<sup>17</sup> See Kaplow, *supra* note 16 at 6. (“[S]tandard approaches to defining agreement, which require the presence of particular, purely symbolic communications while excluding tangible behavior that communicates, have as their underlying logic the notion that ‘words speak louder than actions.’ Of course, the more familiar, opposite maxim is better rooted in common sense . . . .”); see also Dennis W.

courts on issues that are a distraction at best and counterproductive at worst. We will explore in a bit some of the main points he makes. Note, however, that Kaplow's analysis assumes markets remain much as they have in the past. That assumption may not be realistic.

Enter AI. Two features of AI are particularly important for present purposes. First, AI may greatly increase the harms from interdependent pricing. AI holds the potential to enable such pricing to succeed in circumstances where it currently would likely fail and to raise prices closer to monopoly levels when it does succeed. Second, AI may make interdependent pricing immune from legal liability. A reason is that for the foreseeable future AI will likely be incapable of forming any intent, a requirement for civil liability. Let's take these points one at a time.

AI may make interdependent pricing far more prevalent and far more effective when it occurs.<sup>18</sup> To understand this point, it is important to note a dynamic that lies at the heart of antitrust laws. It is what one might call a collective action problem or a coordination problem. But it isn't really a problem; it's a solution. The difficulty market actors have in acting collectively—in coordinating their behavior—is salutary. The collective action problem ordinarily involves prices (or, what generally amounts to the same thing, output). One of the main mechanisms of antitrust is to encourage sellers in the same market to compete for market share by lowering their prices. That competition ultimately benefits consumers. But it harms the competitors. They would maximize their profits by charging higher prices and producing less. The profit-maximizing model for the competitors would be to charge the same amount and produce the same quantity as would a single seller with complete control of the market, a monopolist. The competitors would do best if they collectively emulate the behavior of the monopolist. But that is not practical for them to do in a competitive market. If there are a large number of sellers of equivalent products—say, pencils—with equivalent cost structures, they generally cannot effectively resist competition. If one of the sellers charges more than the competitive price for pencils, another seller will sell at a lower price and steal market share. The sellers' failure to mimic a single seller of pencils through collective action or coordination redounds to the benefit of society as a whole. Or so antitrust theory runs.

The above analysis explains much of antitrust law. It provides a reason that antitrust law will prohibit mergers and acquisitions if a small number of firms control a large percentage of a market. A merger or acquisition will further consolidate control of the market, threatening competition. On the other hand, if there are a large number of firms in a market—each with a relatively small market share—a merger or acquisition is unlikely to harm competition. We rely on the difficulty that large numbers of actors have in coordinating their behavior to ensure well-functioning markets. So the collective action problem in markets is a feature of antitrust law, not a bug. Ideally, the problem would

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Carlton et al., *Communication Among Competitors: Game Theory and Antitrust*, 5 GEO. MASON L. REV. 423 (1997) (“[A]ttempts to determine the legality of many forms of communication by assessing whether or not they conform to some connotation of the word ‘agreement’ are inappropriate—at least when viewed from the vantage point of economics.”).

<sup>18</sup> See Ariel Ezrachi & Maurice E. Stucke, *Artificial Intelligence & Collusion: When Computers Inhibit Competition*, 2017 U. ILL. L. REV. 1775, 1791–92 (2017) (“[C]omputers, in quickly processing their market and customers’ proprietary data, may be more effective in monitoring rivals’ prices or customers, which not only increases transparency but the risk of coordination.”).

be insurmountable. Firms would then have to compete on price, or quality, or the like—to “compete on the merits,” to coin an antitrust phrase.

AI poses a threat to antitrust law that derives from its ability to overcome collective action or coordination problems. As noted above, there is substantial evidence that firms run by human beings will not be able to emulate monopolists if the firms are sufficiently numerous and sufficiently similar to each other in key respects, such as their costs, and if each has a sufficiently low market share and acts independently. The collective action problem is too formidable. But AI holds the potential to solve previously insoluble problems. AI could be programmed to maximize profits in pricing. And it may be able to act sufficiently quickly and subtly to coordinate with even large numbers of other firms also operated by AI. Just as a small number of firms run by human actors can compete in a way that will collectively benefit them by mimicking a monopolist—or approximating monopolist prices—so may a large number of firms run by AI. Indeed, it is possible that an entrepreneur could develop pricing AI that has precisely this effect—especially if all sellers in a market rely on it—and that the sellers in a market could all buy the pricing AI for that reason. Voila—independent action leads in effect to price fixing.<sup>19</sup> The result could be that many markets—even if they contain large numbers of firms, each with relatively small market shares—may look a lot like they are dominated by a single seller. And the prices the sellers charge in those markets may be closer to monopoly prices than would occur if human beings were in charge of pricing decisions.

There is no precise, generally accepted definition of AI.<sup>20</sup> It includes a suite of technologies capable of self-learning and other behavior that resembles human intelligence.<sup>21</sup> AI can solve problems or make automated decisions for tasks that are typically thought to require higher order cognitive processes, including vision, spatial reasoning, and conceptualization.

Broadly, there are two AI approaches: the first is logic or rule-based AI—using deductive reasoning—and the second is machine learning or algorithmic AI—using inductive reasoning. The goal of the rule-based system is to model real-world processes using logic-based rules that a program can understand. To create a rule-based AI system, groups of engineers and experts come together to identify certain real-world rules and translate those into computer rules.<sup>22</sup> A familiar example is Turbotax, a software program created by Intuit, that is used by consumers to calculate income tax

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<sup>19</sup> We might treat the decision of each seller to buy the AI as equivalent to a decision to join a conspiracy. But given that there is no agreement that all of the sellers will do so, that just seems to beg the question.

<sup>20</sup> See generally, Mark A. Lemley & Bryan Casey, *You Might Be a Robot*, CORNELL L. REV. (2019), available at [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3327602](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3327602) (discussing how there is “no consensus definition of ‘robot,’ much less its common technological constituents such as ‘artificial intelligence,’ ‘automating software,’ or ‘sensory perception.’”).

<sup>21</sup> See Edwina L. Rissland, *Artificial Intelligence and Law: Stepping Stones to A Model of Legal Reasoning*, 99 YALE L.J. 1957, 1958 (1990) (“In 1968 Marvin Minsky, one of the founders of AI, said it well: AI is ‘the science of making machines do things that would require intelligence if done by man.’”); see also *Artificial Intelligence*, Merriam-Webster, available at <https://www.merriam-webster.com/dictionary/artificial%20intelligence>.

<sup>22</sup> See Rissland, *supra* note 21 at 1965 (“In the rule-based approach, a rule is encoded in a simple, stylized if-then format: If certain conditions are known to hold, then take the stated action or draw the stated conclusion. Rule-based systems work by chaining these rules together.”).

liability. Turbotax models real-world rules (i.e., the U.S. Internal Revenue Code), in a way that faithfully represents the logic and meaning of them.<sup>23</sup> For instance, the software rule might state: *if a user's income is >\$100,000, then, the program should apply a 20% tax rate to that user's application.* This form of AI gives computers the ability to deduce conclusions in long, complex chains faster than the human mind could.

A second approach to AI is machine learning.<sup>24</sup> This suite of algorithms find patterns in data and can infer rules themselves. The algorithms learn which characteristics reflected in data tend to lead toward the objective they are designed to pursue.<sup>25</sup> Machine learning has enabled AI to best the world champions in chess and Go. These self-learning patterns can also serve as digital intermediaries or helpful assistants that recommend movies, products, spouses, price-match,<sup>26</sup> or even determine prices<sup>27</sup> to charge customers.

AI can play in many roles in organizations. It can be an efficiency tool guided by the human mind to make mundane tasks faster. Alternatively, it can serve as a conduit or a facilitating device to execute tasks that are anticompetitive, or even *per se* illegal, when human actors perform them. As Salil Mehta puts it, pricing judgments are “increasingly being transferred away from humans to algorithm-driven software.”<sup>28</sup> AI can now step into decision making shoes, and be the price-setter or robo-seller.<sup>29</sup> In this alternate universe, consumers may suffer economic harms that they would escape if imperfect human actors were setting prices rather than machines.

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<sup>23</sup> See Sarah B. Lawsky, *Formalizing the Code*, 70 TAX L. REV. 377, 379 (2017); Meg Miller, *How TurboTax Used Design to Win the Tax Wars*, *Fast Company* (Mar. 30, 2016), available at <https://www.fastcompany.com/3056784/how-turbotax-used-design-to-win-the-tax-wars>; see also *How TurboTax Used Design and Emotion to Solve a Boring Problem and Dominate an \$11B Industry*, Product Habits, available at <https://producthabits.com/how-turbotax-used-design-and-emotion-to-solve-a-boring-problem-and-dominate-an-11b-industry/>.

<sup>24</sup> See Harry Surden, *Machine Learning and Law*, 89 WASH. L. REV. 87, 89 (2014) (“‘Machine learning’ refers to a subfield of computer science concerned with computer programs that are able to learn from experience and thus improve their performance over time”); see also Ai Deng, *An Antitrust Lawyer's Guide to Machine Learning*, ANTITRUST, Spring 2018, at 82, 86.

See Ajay Agarwal, Joshua Gans, and Avi Goldfarb, *PREDICTION MACHINES: THE SIMPLE ECONOMICS OF ARTIFICIAL INTELLIGENCE* (Harvard Business Review Press 2018).

<sup>26</sup> See *Macy's Peers into the Hearts of Consumers with Predictive Analytics*, Retail Info Systems News (May 19, 2014), available at <http://risnews.edgl.com/retail-news/Macy-s-Peers-Into-the-Hearts-of-Customers-with-Predictive-Analytics-92848>; James Surowiecki, *In Praise of Efficient Price Gouging*, MIT TECH. REV. (Aug. 19, 2014), available at <https://www.technologyreview.com/s/529961/in-praise-of-efficient-price-gouging/>.

<sup>27</sup> Ezrachi & Stucke, *supra* note 18 at 1780 (“[C]omputers can assess and adjust prices—even for particular individuals at particular times—within milliseconds.”).

<sup>28</sup> Salil K. Mehra, *Antitrust and the Robo-Seller: Competition in the Time of Algorithms*, 100 MINN. L. REV. 1323, 1338 (2016).

<sup>29</sup> See John D. Sutter, *Amazon Seller Lists Book at \$23,698,655.93—Plus Shipping*, CNN (Apr. 25, 2011), available at <http://www.cnn.com/2011/TECH/web/04/25/amazon.price.algorithm/index.htm> (Two

When human beings use algorithms to implement illegal agreements, algorithmic actors are not supposed to receive favorable treatment in the eyes of antitrust law.<sup>30</sup> Toward this end, the FTC created the Office of Technology, Research, and Investigation. It researches how algorithms affect consumers.<sup>31</sup> But what happens when algorithms perform tasks without communications or “agreements” with one another? Each machine learning algorithm can be coded to make decisions based on its predictions of the best responses of other parties in the market,<sup>32</sup> and engage in a form of follow-the-leader pricing. This could lead to parallel conduct without prior agreement, which could be facilitated automatically.<sup>33</sup>

Existing antitrust law generally imposes an intent requirement for criminal or civil liability for price fixing.<sup>34</sup> AI is currently unable to form intent.<sup>35</sup> Technologists have no reason to believe AI is conscious and have no idea how to build conscious AI. Consciousness, it would seem, would be

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companies purchased the same algorithm that entered into a price-war with one another, and within a week, drove the price of a biology textbook titled “The Making of a Fly” up to a whopping \$23.7 million.).

<sup>30</sup> In *United States v. Topkins*, David Topkins and his co-conspirators agreed to fix the prices of posters sold through Amazon and implemented their arrangement by purchasing certain price fixing algorithms. See Plea Agreement at 3-4, *United States v. Topkins*, No. 3:15-cr-00201-WHO (N.D. Cal. Apr. 30, 2015); see also DOJ Press Release, April 6, 2015, available at <https://www.justice.gov/opa/pr/former-e-commerce-executive-charged-price-fixing-antitrust-divisions-first-online-marketplace> (Assistant Attorney General Bill Baer of DOJ’s Antitrust Division stated, “Today’s announcement represents the division’s first criminal prosecution against a conspiracy specifically targeting e-commerce. We will not tolerate anticompetitive conduct, whether it occurs in a smoke-filled room or over the Internet using complex pricing algorithms”); see also *United States v. Airline Tariff Publ’g Co.*, 836 F. Supp. 9 (D.D.C. 1993).

<sup>31</sup> See Jill Priluck, “When Bots Collude,” *NEW YORKER* (April 25, 2015), available at <http://www.newyorker.com/business/currency/when-bots-collude> (last visited May 23, 2020).

<sup>32</sup> See Ezrachi & Stucke, *supra* note 18 at 1782.

<sup>33</sup> *Id.*; see also Michal S. Gal and Niva Elkin-Koren, *Algorithmic Consumers*, 30 HARV. J.L. & TECH. 309, 347 (2017) (“Once we introduce algorithms, not only does oligopolistic coordination become more durable, but it may also actually be facilitated in non-oligopolistic markets, ones in which many competitors operate. The requirement that a prior agreement exist among market players therefore does not fit the algorithmic world.”).

<sup>34</sup> In *Poller v. Columbia Broad. Sys., Inc.*, the Supreme Court noted that “motive and intent play leading roles” in antitrust litigation. 368 U.S. 464, 473 (1962). Similarly, in *Business Electronics Corp. v. Sharp Electronics Corp.*, Justice Stevens, in his dissent, noted that “in antitrust, as in many other areas of the law, motivation matters and factfinders are able to distinguish bad from good intent.” 485 U.S. 717, 754 (1988) (citing *Aspen Skiing Co. v. Aspen Highlands Skiing Corp.*); Thomas A. Piraino, Jr., *The Case for Presuming the Legality of Quality Motivated Restrictions on Distribution*, 63 NOTRE DAME L. REV. 1, 4, 16-19 (1988).

<sup>35</sup> Yavar Bathaee, *The Artificial Intelligence Black Box and the Failure of Intent and Causation*, 31 HARV. J.L. & TECH. 889, 906 (2018) (“Machines and computer programs have no intent. The most we can glean from how they work and how they are designed is what goals their users or creators sought to achieve and the means they permitted their machine or program to use to achieve them.”).



necessary to meet the intent requirement under antitrust law. Intent is a mental state. Creatures without consciousness do not have mental states. So AI would seem unable to form the kind of intent necessary for its pricing decisions to give rise to liability under the antitrust laws.

By deploying AI, then, sellers could potentially insulate themselves from antitrust sanctions for elevating prices above competitive levels. They could instruct AI to charge profit-maximizing prices. That by itself would not seem to violate the laws. It does not entail any human intention to conspire with other sellers. AI may then be able to “solve” the pricing problem, identifying patterns of pricing behavior that enable multiple sellers to achieve or approximate monopoly profits. If all the sellers in an industry use AI in this way, all may enjoy higher profits than they otherwise could. And if they each make this decision independently—perhaps aware that other sellers are using AI in the same manner but without any agreement to do so—the proscription on price-fixing agreements may be rendered obsolete. Antitrust law may become as useless in protecting us from supracompetitive prices as a knight’s armor is against a machine gun.

## **II. WHAT TO DO ABOUT AI AND INTERDEPENDENT PRICING?**

How, then, to respond to this threat? A possibility is to adopt the approach that Posner proposed a long time ago (and later rejected) and that Kaplow has more recently tentatively embraced. We could put aside the intent requirement in favor of proscribing conduct that leads to supracompetitive pricing. We could do so by taking away the free pass for interdependent pricing, at least when market actors rely on AI for their pricing decisions.

This approach would have the attractive characteristic that it would target the harm we care about—elevation of prices above competitive levels—rather than one means of achieving that harm—an agreement among competitors. Moreover, as Kaplow notes, the agreement requirement—to the extent it can be made coherent—in practice reduces a requirement of showing certain kinds of communications between market actors. But we don’t really care about the existence of an agreement, much less about whether market actors communicate with each other and, if so, how they do so. Perhaps it would be better, then, to get to the heart of the matter and proscribe interdependent pricing that elevates prices above competitive levels, however it is achieved, at least if AI contributes to the effort.

There are various potential objections to a proposal along these lines. Key ones include that it is intrinsically wrong not to require intent for liability, that the relevant statutory language imposes an intent requirement, that banning interdependent pricing would not provide adequate notice to market actors about what conduct is prohibited and what conduct permitted, that proving interdependent pricing would not be feasible, that such a prohibition would also deter procompetitive conduct, that it is difficult to fashion an appropriate remedy, and that it would be improper to apply a different standard to conduct by AI than by human beings. We will take these topics one at a time. The position we will explore is that AI changes the analysis in favor of prohibiting interdependent pricing. We will then also suggest that working through these points tends to confirm that Kaplow’s tentative conclusion is correct: we may want to extend a prohibition on interdependent pricing beyond AI to purely human conduct as well.

Most of the analysis that follows will focus on effects. It will be consequentialist. But there is a preliminary issue worth considering, one that is not consequentialist (call it deontological). The issue is whether it is intrinsically wrong to punish conduct—even civilly—if there is no culpable intent

behind it. There are various areas of the law in which this sort of concern should be taken seriously. Federal antitrust law in the United States is not one of them. Our courts have long interpreted civil liability under the federal antitrust laws to promote efficiency, not to serve other potential ends. There is a good argument that in doing so they have not remained true to original statutory intent, refusing to deter or punish behavior that federal laws were meant to address. But that ship has sailed. Modern economic theory—with its commitment to consequentialism—is ascendant. A movement that began more than fifty years ago—championed by Richard Posner and Robert Bork, among others—has prevailed. It is well settled that courts are supposed to apply federal antitrust law in a way that will maximize welfare (even though there is disagreement about how to define that term). Requiring intent for civil liability for intrinsic reasons would be contrary to that approach.

A somewhat similar concern is that the statutory language of the federal antitrust laws requires intent. It might be argued that prohibiting interdependent pricing would require a legislative amendment, not merely judicial decision-making. This position is unpersuasive. As Kaplow has shown, the language of the federal antitrust law is more than broad enough to prohibit interdependent pricing.<sup>36</sup> Section 1 of the Sherman Act proscribes “[e]very contract, combination in the form of trust or otherwise, or conspiracy in restraint of trade or commerce.”<sup>37</sup> To note just one of Kaplow’s points, interdependent pricing involves the requisite combination of different sellers and, if there were any doubt about this, the statute provides that the combination can be “in the form of a trust or otherwise,” making explicit that the form of the combination does not matter; the phrase “or otherwise” encourages an expansive reading of the term combination.<sup>38</sup> So what should matter is whether market actors combine to restrain trade or commerce in a way that causes improper anticompetitive harm, not how their combination is structured. Along these lines, it is worth noting that the Sherman Act prohibits every contract in restraint of trade or commerce.<sup>39</sup> As has been noted, every contract restrains trade. The courts, however, have read the statute to make economic sense, allowing contracts when they are on net procompetitive. Fair enough. But, using similar purposive reasoning, the Sherman Act also enables courts to prohibit combinations—like interdependent pricing—if they are on net anticompetitive. As the courts have repeatedly held, what matters in federal antitrust law is substance, not form.

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<sup>36</sup> See Kaplow, *supra* note 16 at 69-77.

<sup>37</sup> 15 U.S.C. § 1 (1964). In a recent judgment, the Supreme Court awarded a victory for an independent contractor who sought to have an arbitration agreement stricken. *New Prime Inc. v. Olivera*, 139 S. Ct. 532 (2019). Justice Ginsburg wrote a brief concurrence cautioning against literal interpretation of the words Congress used while crafting the Federal Arbitration Act. In support of a dynamic interpretation, Justice Ginsburg wrote, “Congress . . . intended [the Sherman Antitrust Act’s] reference to ‘restraint of trade’ to have ‘changing content,’ and authorized courts to oversee the term’s ‘dynamic potential.’” *Id.* at 544 (2019) (quoting *Business Electronics Corp. v. Sharp Electronics Corp.*, 485 U.S. 717, 731-732, (1988)).

<sup>38</sup> See KAPLOW, *supra* note 16 at 71.

<sup>39</sup> Section 1 states, “Every contract, combination in the form of trust or otherwise, or conspiracy, in restraint of trade or commerce among the several States, or with foreign nations, is declared to be illegal.” 15 U.S.C. § 1 (2006).

Let us turn, then, from formalism to economics. A first economic concern is that market actors would not have adequate notice of what they may and may not do if interdependent pricing can lead to civil liability. Distinguishing would not be easy between prices that will be perceived as competitive and prices that will be considered interdependent. So a seller may be unable to tell whether the prices it plans to charge are legal.

AI may make distinguishing easier between licit and illicit pricing. One of the difficulties with human market actors is that we cannot look inside people's minds—we cannot tell whether their intent, for example, is to match an elevated price and thereby avoid competition or if it is to mimic another seller's price out of a belief that it is set at ideal competitive levels given current demand. But the same may not be true with AI. It is possible to have AI maintain a record of the “decisions” it makes and its basis for doing so. This is no mean feat, but it may be possible. AI processes information in a way that can be analyzed as human thought cannot be (at least not yet).<sup>40</sup> We—perhaps with the help of forensic AI—might be able to determine whether a seller's AI recommended prices are based on an analysis of competitive forces or a strategy of engaging in interdependent actions.<sup>41</sup> So with the expansion of AI into pricing decisions, we might see an increase in our ability to assess the nature of those pricing decisions. And if sellers do not want to run afoul of the law, they can make sure that their AI seeks to maximize profits in a competitive manner rather than taking actions that maximize profits by avoiding competition and relying on other sellers to do the same. For these reasons, proscribing interdependent pricing by AI may create less uncertainty than proscribing it by human sellers.

There is also a questionable assumption built into the concern that banning interdependent pricing would make the law less certain. The assumption is that current law governing price fixing is reasonably clear. It isn't. As Kaplow has shown, the consensus that price-fixing conspiracies should be illegal masks profound disagreements about what that proscription means.<sup>42</sup> It is easy to

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<sup>40</sup> But note that in a recent study at the University of California San Francisco, scientists created and trained an algorithm to decode brain waves and convert them into audio files. The algorithm uses “an array of electrodes” that are “surgically placed onto the part of the brain that controls movement, and a computer simulation of a vocal tract to reproduce the sounds of speech.” Chelsea Whyte, *Mind-reading Device Uses AI to Turn Brainwaves into Audible Speech*, NEWS SCIENTIST (Apr. 24, 2019), *available at* <https://www.newscientist.com/article/2200683-mind-reading-device-uses-ai-to-turn-brainwaves-into-audible-speech/#ixzz6Pr70Pufw>; *see also*, Anthony Cuthburtsen, *Artificial Intelligence Translates Thoughts to Text Using Brain Implant*, INDEPENDENT (March 31, 2020), *available at* <https://www.independent.co.uk/life-style/gadgets-and-tech/news/artificial-intelligence-brain-implant-ai-mind-reading-neuralink-a9437806.html>. A Russian research firm, Neurobotics, recently trained an algorithm to “guess what videos people were watching purely from their brainwaves.” Matthew North, *AI Recreates Videos People Are Watching By Reading Their Minds*, NEWS SCIENTIST (Nov. 26, 2019), *available at* <https://www.newscientist.com/article/2224866-ai-recreates-videos-people-are-watching-by-reading-their-minds/>.

<sup>41</sup> This effort might require sellers to keep records of what their AI has done. They might do so anyway or the law might incentivize them to do so, perhaps by creating an adverse inference if they do not.

<sup>42</sup> In Chapter 2 of Kaplow's book, “Defining the Problem,” Kaplow examines the inconsistent interpretation of certain terms that are integral to price-fixing judicial decisions, *e.g.*, “conspiracy,” “meeting of the minds,” “independent,” and “interdependent.” Kaplow, *supra* note 16 at 29-43; *see also*

underestimate how messy—even incoherent—the law is now. As a result, prohibiting interdependent conduct might make the law clearer because current law is such a muddle.

To see this, consider the difficulty of determining whether price fixing has occurred. Plaintiffs in price-fixing cases can rely on direct evidence, circumstantial evidence, or some combination of the two. Although the line between direct and circumstantial evidence is not always clear, and may ultimately be incoherent, some examples seem easy to characterize. Direct evidence may include obvious inculpatory statements. An employee at Company A writes an email to an employee at Company B, “Let’s fix prices at \$100!” The employee at Company B writes back, “Good idea. I agree to do so!” This sort of explicit conspiracy would ordinarily be treated as direct evidence (although Company A and Company B may well later argue in court that the employees were being sarcastic, misleading one another, or the like).

On the other hand, purchasers from Company A and Company B may discover evidence that they claim, all else equal, makes a conspiracy more likely than it otherwise would be. This sort of evidence is often described as falling within “plus factors,” that is, categories of evidence suggestive of a conspiracy.

Here the real confusion begins. Take as an example evidence that Company A and Company B together have a dominant market share for sales of a product and that they charged higher prices than they would have in a competitive market. Let’s say there is economic evidence that their prices varied upward from the amounts that would have been predicted based on their past behavior and underlying economic conditions. A statistical model may indicate supracompetitive pricing that seems inexplicable in the absence of a change in the companies’ pricing strategies. Charging those supracompetitive prices, one might reason, would be against each company’s economic interests in the absence of a conspiracy. It would make each vulnerable to losing market share to lower prices from its competitor. And given that the two companies together have a dominant market share, a conspiracy would seem to be particularly feasible. The general view is that conspiracies are more likely and more stable if they require the involvement of a relatively small number of entities. One might infer from these circumstances, then, that a conspiracy was afoot. Many courts have reasoned in just that way. They may also rely in part on the doctrine that a *tacit* agreement can suffice for liability, so such circumstantial evidence can suffice to establish a contract, combination, or conspiracy, as required by the Sherman Act.

Other courts, however, have taken the opposite view. They have noted a market with a small number of sellers that together have a large market share are susceptible to oligopolistic interdependent pricing. In other words, those sellers may be able to achieve prices above competitive levels without conspiring. This leads to what has been called a paradox of proof: that the markets most susceptible to price fixing are often also the markets most susceptible to anticompetitive conduct through interdependent action without any agreement.<sup>43</sup> As a result, if the odds of supracompetitive prices through independent oligopolistic behavior get too high—so high that the ordinary trappings of an agreement are unnecessary—courts may find the market conditions *undermine* an inference that

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Louis Kaplow, *On the Meaning of Horizontal Agreements in Competition Law*, 99 CAL. L. REV. 683, 696-704 (2011).

<sup>43</sup> See Kaplow, *supra* note 16 at 126.

there was a conspiracy. Reasoning along these lines can result in courts granting summary judgment for defendants.

Given this sort of fundamental disagreement between courts—these opposite ways of reasoning—it is fair to say that the law at present is uncertain, even internally inconsistent. At least in these circumstances, the law could be clearer—and market actors could benefit from more certain guidance—if courts were to tackle directly the issue that matters from the perspective of economic policy: have the defendants caused the kind of anticompetitive harm that the antitrust laws are designed to prevent? That happens if prices are elevated above competitive levels, whether sellers achieve that result through some form of agreement or by combining their efforts through interdependent pricing without entering an agreement, whatever that means. If defendants collectively have managed to elevate and maintain prices substantially above competitive levels, courts might reason, there is an antitrust violation. If not, there isn't one. And, to repeat, use of AI by market actors may make that inquiry easier to conduct than it otherwise would be. We may be able to distinguish with greater certainty than we have in the past whether a company is pricing competitively or engaging in interdependent pricing. And, again, the alternative may not lead to all that much predictability anyway.

Another potential criticism of proscribing the use of AI to achieve supracompetitive interdependent pricing is that proving such a claim would not be feasible. This is one of the main points Posner makes in critiquing Kaplow's book.<sup>44</sup> It is also perhaps the least persuasive. A main reason is that the burden of proving an antitrust claim lies with the plaintiffs. If proof is unavailable or impractical as to whether pricing is interdependent—as opposed to purely independent—plaintiffs will lose. If such proof is generally lacking, plaintiffs will bring few such claims. (Some plaintiffs and attorneys may learn this lesson the hard way, but if so they will pay a financial price and will adjust their behavior over time or continue to suffer adverse consequences.) In short, even if it is difficult for plaintiffs to prove interdependent pricing without evidence of a conspiracy—such as suspect communications between sellers—that does not seem to be a good reason to deprive them of the opportunity to try—for making interdependent pricing in the absence of an agreement *per se* legal.

Another point is that to prevail on an antitrust claim—even a *per se* claim—civil plaintiffs have to prove not only an antitrust violation but also that the violation caused them harm. This element is often called “impact.”<sup>45</sup> Posner's concern, in effect, is that plaintiffs may be able to show an agreement in some cases, but it is very difficult for them to establish that they paid prices that were set above competitive levels. The latter showing is what is necessary to prevail on a claim of interdependent pricing. But buyers need to make that showing in any case. So proof of interdependent pricing is a subset of the proof necessary to establish liability in a case based on an agreement. Plaintiffs often

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<sup>44</sup> Posner, *supra* note 15 at 767.

<sup>45</sup> See *In re Hydrogen Peroxide Antitrust Litigation*, 552 F.3d 305, 311 (3d Cir. 2008), as amended (Jan. 16, 2009) (“In antitrust cases, impact often is critically important for the purpose of evaluating Rule 23(b)(3)'s predominance requirement because it is an element of the claim that may call for individual, as opposed to common, proof.”); *Blades v. Monsanto Co.*, 400 F.3d 562, 566 (8th Cir. 2005); *Simpson v. Union Oil Co. of Cal.*, 311 F.2d 764, 767 (9th Cir. 1963), *rev'd*, 377 U.S. 13 (1964).

satisfy their burden regarding impact by relying in part on a statistical model.<sup>46</sup> The same sort of statistical model that works in cases involving an alleged agreement should also work in cases of alleged interdependent pricing.

One might wonder: why bother proscribing interdependent pricing without an agreement if it is difficult to prove? The change might seem symbolic. But it wouldn't be. At the very least, it would eliminate a perverse dynamic in the law, one that Kaplow identifies. As he explains, requiring an agreement for liability—which, as noted, in effect often means requiring evidence of certain kinds of communications—“tends to exonerate defendants in precisely those cases in which deterrence benefits are greatest and chilling costs lowest.”<sup>47</sup>

This point takes us back to the paradox of proof. When there are a small number of sellers in a market, and they collectively have a lot of market power, the risk of interdependent pricing is particularly high, as is the likelihood of resulting anticompetitive harm. If nothing else, proscribing supracompetitive prices achieved through interdependence would eliminate a highly dubious defensive strategy. Sellers would not be able to say that circumstantial evidence of a conspiracy is insufficient because they in fact achieved the same harm to competition by other means—through purely interdependent pricing. That claim would be tantamount to confessing to an antitrust violation. Even if proving interdependent pricing is otherwise difficult, a confession should suffice to get to a jury.

Posner also worries about the risk of deterring procompetitive conduct.<sup>48</sup> It is hard to generalize about this possibility. Fortunately, Posner offers some examples. Some involve a risk of chilling procompetitive behavior, while others may illustrate unpredictability or difficulties of enforcement, but they all warrant consideration. In his first example he suggests the plight of a seller in a market that is favorable to interdependent pricing. If the seller would maximize profits by matching the prices of other sellers, Posner asks what the seller should do to avoid potential civil liability. Cost-plus pricing? If so, he explains, the courts would in effect be burdened with setting prices, which has been “discredited, and would require a total institutional makeover of antitrust law.”<sup>49</sup>

But this problem seems far more theoretical than practical. The seller—call it Company A—could simply charge an amount non-trivially below the other sellers in the market. If the other sellers do not respond in kind—perhaps because the impact of the new seller will be limited—Company A will gain market share, enjoy nice profits, and almost certainly be protected from liability. Suing the one cost-cutter in a market is very unlikely to prove successful. On the other hand, if other sellers

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<sup>46</sup> Jonathan B. Baker & Daniel L. Rubinfeld, *Empirical Methods in Antitrust Litigation: Review and Critique*, 1 AM. L. & ECON. REV. 386, 387 (1999).

<sup>47</sup> See Kaplow, *supra* note 16 at 451.

<sup>48</sup> Posner, *supra* note 15 at 763 (“And might not entry into concentrated markets be deterred because an entrant who, having successfully entered such a market, charged the prevailing market price would be a tacit colluder and could be prosecuted as such, if tacit collusion were deemed to violate the Sherman Act?”).

<sup>49</sup> Posner, *supra* note 15 at 763.

respond in kind to Company A, Company A would have incentive to lower its prices if they are still obviously elevated above competitive levels. That, again, would win it market share. If its prices are not obviously above competitive levels, it should be able to hold them steady. After all, as Posner has pointed out, proving interdependent pricing has elevated prices above competitive levels is not easy. Prices that roughly approximate what would occur in competition are unlikely to result in a successful antitrust lawsuit.

Posner also suggests the possibility that a potential market entrant might be deterred by the risk of charging the prevailing market prices and thereby incurring liability.<sup>50</sup> The response to this concern is largely the same as the one to the example above. If prices are well in excess of competitive levels, the new seller should be able to enter the market, attract customers at a profit, and avoid being sued by charging prices that are below those of the incumbents and that are not too obviously above competitive levels. Again, if prices are not far in excess of competitive levels, a civil lawsuit is unlikely. Proof of harm would be too difficult.

Posner also offers an example of one seller—seller X—who doesn’t pursue sales to its competitors’ “sleepers,” that is, customers who are too indolent or ignorant to shop around.<sup>51</sup> The reason to refrain from pursuing the sleepers of another company—seller Y—is fear of retaliation, which would result in competition and thus harm both seller X and seller Y. Three points are worth noting in response to this scenario. First, refraining from pursuing sleepers does not seem to have procompetitive benefits. So why worry that X and Y might feel compelled to compete with one another for these sales? Second, plaintiffs will have to show that the failure to compete for sleepers resulted in their paying higher prices than they would have in a competitive market. That will not be easy unless the conduct of sellers X and Y is egregious and has a widespread effect on the market—in other words, that their behavior is clearly anticompetitive and well worth discouraging from the perspective of efficiency. Again, proving interdependent pricing is difficult unless it has significant effects on the market and is obvious.

There is a third, related practical point that is important. Claims by purchasers are almost always brought as class actions.<sup>52</sup> The requirements of class certification make it unlikely that plaintiffs will bring cases that affect only a small, ill-defined subgroup of purchasers, such as sleepers. Those requirements also discourage cases based on only small overcharges. The reason is that courts generally interpret the certification standard of Federal Rule of Civil Procedure 23 as requiring plaintiffs in antitrust actions seeking damages to offer evidence capable of showing injury that is widespread across a proposed class.<sup>53</sup> Some courts go so far as to require that such evidence is capable

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<sup>50</sup> *Id.* at 763, 765.

<sup>51</sup> *Id.* at 763-64.

<sup>52</sup> Joshua P. Davis & Robert H. Lande, *Toward an Empirical and Theoretical Assessment of Private Antitrust Enforcement*, 36 SEATTLE U.L. REV. 1269, 1286 (2013). Competitors would not be able to bring claims for interdependent pricing because they benefit—they are not harmed—when prices are elevated above competitive levels.

<sup>53</sup> Joshua P. Davis & Eric L. Cramer, *Of Vulnerable Monopolists: Questionable Innovation in the Standard for Class Certification in Antitrust Cases*, 41 RUTGERS L.J. 355, 382 (2009).

of showing harm to nearly all—or even all—class members.<sup>54</sup> So an antitrust lawsuit on behalf of all purchasers when conduct affects only a modest number of sleepers is not likely to be certified for class treatment.<sup>55</sup>

Further, all else equal, the smaller the alleged overall overcharge is in a case, the harder it is to show widespread harm to a class. The effects of an antitrust violation will vary somewhat from class member to class member. When those effects are relatively minor, variations between class members can mean that a significant proportion of a purchaser class was not harmed at all. Again, this can cause a court to deny class certification, which is generally a death knell for private purchaser antitrust actions.

Posner offers a few other possibilities for why two sellers—X and Y—would price similarly for apparently innocent reasons.<sup>56</sup> One is that X believes Y has insights into demand that X doesn't have. If that is true, Y would be pricing close to competitive levels—the issue is just what they are—and, again, the odds plaintiffs could bring a successful suit against conduct that so closely approximates competition is poor at best. Other possibilities Posner suggests are that X is afraid (1) it will win sales through competitive prices, but Y will gain a strategic advantage on the whole by increasing its profits from the customers it retains, and X's shareholders will be dissatisfied; or (2) Y will use its increased prices to finance product improvements that will give it a competitive advantage. It is hard to know how seriously to take these examples. As to the first, while it may be possible—at least in a market with heterogeneous products—one would think that more often Y's strategy would be unprofitable in the face of competition from X on price—hence the notion that elevated prices often involve interdependence. At the least, some empirical evidence of a common pattern should accompany such speculation. The same point applies with even more force to the second example, which would justify not only interdependent pricing but also explicit agreements to fix prices. They too can result in excess profits that could in theory fund product improvements. But, as the Supreme Court held long ago, experience tells us that in reality horizontal price fixing overwhelmingly harms competition and so we condemn it as *per se* illegal.<sup>57</sup> We should demand evidence before accepting a justification for interdependent pricing that would apply to horizontal price fixing as well.

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<sup>54</sup> *Id.* Such a requirement may well be inconsistent with Rule 23. *Id.*

<sup>55</sup> It might seem that the class could be defined to include only sleepers, but that would be difficult to do. It would be hard to define a sleeper in an objective way that does not depend on proving the merits of the lawsuit, and so such a class definition would run into ascertainability problems.

<sup>56</sup> Posner, *supra* note 15 at 764.

<sup>57</sup> See, e.g., *United States v. Trenton Pottery Co.*, 273 U.S. 392 (1927) (horizontal price fixing); *Arizona v. Maricopa County Medical Soc.*, 457 U.S. 332 (1982) (agreement among physicians regarding fees they would charge patients was considered *per se* illegal horizontal price-fixing); *Catalano, Inc. v. Target Sales, Inc.*, 446 U.S. 643 (1980) (agreement among competitors to eliminate short-term free credit to customers was held to be *per se* illegal horizontal price-fixing). In *U.S. v. Socony-Vacuum Oil Co.*, 310 U.S. 150 (1940), the Supreme Court held:

[F]or over forty years this Court has consistently and without deviation adhered to the principle that price-fixing agreements are unlawful *per se* under the Sherman Act and that no showing of so-called competitive abuses or evils



There is also the problem of remedies.<sup>58</sup> Assuming plaintiffs prevail in civil litigation, the next issue is what relief they should receive. Here, the answer seems relatively straightforward. Plaintiffs should receive the ordinary measure of antitrust damages. Civil plaintiffs recover treble their damages, as measured under antitrust law. Because the damages antitrust plaintiffs may seek are limited in various ways—plaintiffs in antitrust cases cannot recover for prejudgment interest, dead weight loss, and the like—plaintiffs who are awarded treble damages after a trial in reality generally force defendants to pay about the actual harm they have caused or perhaps a bit more.<sup>59</sup> Moreover, virtually all antitrust cases—even with criminal guilty pleas—settle before trial at a discount for defendants.<sup>60</sup> So ordinary civil antitrust damages tends to result in too little deterrence, not too much deterrence,<sup>61</sup> and the same should be true for cases based on interdependent pricing. For these reasons, there seems to be little reason to adjust the measure of damages in such antitrust cases. The usual rule should work reasonably well—at least compared to allowing no recovery at all.

Of course, civil plaintiffs may also seek injunctive relief. As Posner rightly points out, that could be difficult to frame in cases involving interdependent pricing.<sup>62</sup> Courts understandably tend to be unwilling to tell sellers what prices they should charge. They are also unlikely to impose on sellers some vague and unwieldy mandate, such as requiring them to compete for sleepers. The law governing injunctions provides federal courts ample discretion to deny injunctive relief unless plaintiffs make a proposal that does not give rise to these sorts of problems. That may well mean that policing of interdependent pricing would rely primarily on deterrence effects from the prospect of civil liability in particularly egregious cases. That result seems better than immunizing from liability conduct that has potential to cause on net substantial anticompetitive effects.

Many of the arguments above might support civil liability for interdependent pricing generally, not just when it is effected with the help of AI. But our proposal is more limited. It focuses on use of AI. Framed this narrowly, our proposal creates a final issue. Would it be appropriate to allow plaintiffs to pursue claims based on interdependent pricing if sellers employ AI but not if they rely on human decision-making? In the extreme case—where sellers cede pricing decisions completely to AI—such a distinction is relatively easy to defend. As noted above, AI may greatly increase the anticompetitive effects of interdependent pricing. Markets that were once protected from it by, for example, containing a large number of sellers might succumb. Moreover, AI may make it easier to

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which those agreements were designed to eliminate or alleviate may be interposed as a defense.

*Id.* at 218.

<sup>58</sup> Posner, *supra* note 15 at 764 (“It is one thing to prohibit competitors from agreeing not to compete; it is another to order them to compete.”).

<sup>59</sup> See Robert H. Lande, *Are Antitrust “Treble” Damages Really Single Damages?*, 54 OHIO ST. L.J. 115 (1993).

<sup>60</sup> See John M. Connor & Robert H. Lande, *Not Treble Damages: Cartel Recoveries Are Mostly Less Than Single Damages*, 100 IOWA L. REV. 1997, 2003 (2015).

<sup>61</sup> See Joshua P. Davis, Robert H. Lande, *Defying Conventional Wisdom: The Case for Private Antitrust Enforcement*, 48 GA. L. REV. 1, 74 (2013).

<sup>62</sup> Posner, *supra* note 15 at 765–66.

distinguish competitive from interdependent pricing. Its reasoning can be more transparent than human reasoning and the records of what it does may be less ambiguous.<sup>63</sup> Such a change in the costs and benefits analysis can warrant a different approach.

On the other hand, use of AI need not be binary. Human beings can rely on AI to assist in pricing decisions without deferring to it entirely. Further, an antitrust standard that depends on how sellers use AI could create an incentive to game the system. Sellers, for example, might attempt to involve human beings just enough to keep interdependent pricing without an agreement legal—assuming it is presently legal—while relying on AI sufficiently to make interdependent pricing effective. Those efforts would be a waste, as would trying to police them. So if use of AI becomes widespread—including in making strategic business decisions, such as pricing—it may make sense to impose civil liability for interdependent pricing generally. Doing so might not prevent all of the potential anticompetitive effects from AI but it might mitigate some of them.

### III. CONCLUSION

AI could transform our markets. From the perspective of the firms, it could be a huge boon. Their profits could increase dramatically. From the perspective of antitrust economics, and consumers, it could be a disaster. Fewer goods and services may be available and their prices may be much higher than in competitive markets. Antitrust law as it has been structured to date could be rendered largely obsolete.

So what, if anything, can be done? Well, perhaps nothing needs to be. It is worth acknowledging that AI may not be capable of fulfilling its apparent potential—at least when it comes to coordination among competitors. That would be ideal. But complacency seems unwise. AI may not live up to expectations, but strategic behavior in a game theoretical setting plays to its strengths. So if AI does realize some expectations, coordination with other market actors to maximize profits likely will number among them. Indeed, competitors could each choose a form of AI that is designed to do just that—to form a pre-commitment strategy that would become rapidly apparent to other AI players in the market and allow a collective mimicking of monopolistic behavior. A provider of AI may even hawk its product based on its ability to support interdependent pricing. Multiple players in the same market may each decide independently to buy the particular AI for that very reason. The combined effect of those independent actions could have the same effect as horizontal price fixing. AI might thus perfect interdependent pricing without an agreement.

One possible response would be to prohibit interdependent pricing through use of AI. After all, it is not as if such pricing benefits society. The reason antitrust law condemns horizontal price fixing is that it has harmful effects. If interdependent pricing can achieve the same harmful effects—or approximates them—we could condemn it too. And it can.

Moreover, it may be relatively easy to determine whether AI is competing on the merits—lowering prices or enhancing quality, for example, to increase its market share—or whether it is

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<sup>63</sup> It is unclear how transparent AI's reasoning will be in practice. At present, it does not leave a record of how it makes decisions. On the other hand, the Right to an Explanation in Europe may force companies that sell technology to find ways to explain its reasoning. If so, transparency may be possible in the future.

pursuing conscious parallelism—modulating pricing and output so that if its competitors behave similarly they will all enjoy larger profits than in a competitive market. Particularly if there is a record of the algorithms that AI uses, and of the market information to which it responds, we should be able to detect whether it competes or engages in conscious parallelism. We could even require market actors to keep the relevant records. So we could proscribe interdependent pricing by AI, even if we allow such pricing by human beings.

That approach, however, could give rise to strategic behavior. Sellers would have incentive to seek the best of both worlds: involving human beings enough in business decisions to have a favorable legal standard, while at the same time relying on AI enough to inflate their prices above competitive levels. The right approach, then, might simply be to adjust our antitrust doctrine to accommodate the reality of a pervasive role for AI, if indeed that comes about. We might prohibit interdependent pricing generally. Such a tool would likely result in far more false negatives—findings of non-liability when there should be liability—than false positives—findings of liability when there shouldn't be any. But it would be better than treating interdependent pricing as *per se* legal. Indeed, perhaps we should have banned interdependent pricing all along.