

# COMPETITIVE IMPLICATIONS OF PRICING ALGORITHMS UNDER THE UNITED STATES ANTITRUST LAWS



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Pricing algorithms increasingly are being used by various businesses, in various industries, to achieve various goals. An accurate understanding of the competition issues that may be raised by businesses' use of pricing algorithms, and whether and how the United States antitrust laws can be used to address those issues, will be important to ensuring businesses and consumers can maximize the benefits offered by businesses' use of pricing algorithms, while also appropriately guarding against any potential anticompetitive effects associated with their use. This article identifies certain scenarios in which pricing algorithms may raise competition concerns and how the current United States antitrust laws may (or may not) apply.

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# I. INTRODUCTION

The availability of big data and technological advances in data analytics and artificial intelligence have led to a growing number of companies incorporating algorithmic pricing into their businesses to help make pricing and other strategic decisions. Pricing algorithms can improve competition, maximize efficiencies, and minimize costs by allowing companies to analyze numerous variables and voluminous data in real time when making business decisions. However, government antitrust enforcers and private plaintiffs in the United States have become increasingly concerned about the effects that algorithmic pricing software can have on competition, arguing and alleging that, in certain situations, the use of algorithmic pricing can facilitate explicit or tacit collusion amongst competitors or enable companies to more easily engage in price discrimination or predatory pricing. Some of these arguments are testing the bounds of United States antitrust laws, and courts will need to be the ultimate arbiters of the legality of this often complex and rapidly developing technology. In the meantime, however, companies considering incorporating pricing algorithms into their businesses should be aware of the legal risks associated with them.

In this article, we take a close look at the various competition concerns implicated by algorithmic pricing software. We review the arguments and allegations that government enforcers and private plaintiffs have made against companies who use algorithmic pricing software, and identify the hurdles they have faced and are likely to continue to face in certain circumstances when challenging the use of pricing algorithms under the United States antitrust laws.

## II. PRICING ALGORITHMS

There are varying definitions of algorithmic pricing,<sup>2</sup> but put most simply it means a set of rules for how prices should be determined. The use of pre-set rules and strategies to determine pricing is not a new practice for companies, but the availability of big data and advancements in artificial intelligence and machine learning have significantly improved the capabilities of algorithmic pricing software. Pricing algorithms suggest prices after taking into account any number of data inputs, such as real-time and historic supply and demand conditions, costs, business goals, macroeconomic trends, and, sometimes, competitor prices for the same or similar products or services. Pricing algorithms can also offer dynamic pricing, meaning they can react to changing conditions in real time, and targeted pricing, meaning they can differentiate proposed prices based on data obtained about particular buyers' characteristics and willingness to pay.

Thus far in the United States, antitrust plaintiffs have focused most frequently on competition concerns arising in two particular circumstances: (1) when multiple competitors adopt or agree to use the same algorithmic pricing software product and (2) when an input in the pricing algorithm is competitor data, particularly real-time or confidential pricing data. These circumstances have become more prevalent with the emergence of third party software providers who offer sophisticated algorithmic products and advertise those products to specific industries. However, broader antitrust enforcement may occur as pricing algorithms become more prevalent.

## III. POTENTIAL COMPETITIVE IMPLICATIONS OF USING PRICING ALGORITHMS

Pricing algorithms can present a variety of competition issues. The sections that follow identify some of the different ways in which pricing algorithms may be used to engage in anticompetitive conduct, and how that conduct might be evaluated under existing United States antitrust laws.

### A. Horizontal Price Fixing

The use of pricing algorithms may create antitrust concerns due to their potential to facilitate collusion between competitors. In general, the federal antitrust laws prohibit price fixing among competitors due to its potential to cause various types of harm to consumers, including higher prices, greater scarcity, lower quality, and/or lessened innovation.<sup>3</sup> The United States Supreme Court has held that agreements among competitors to fix prices are per se unlawful under Section 1 of the Sherman Act because they are nearly always anticompetitive.<sup>4</sup>

The use of pricing algorithms in certain contexts may create horizontal price fixing concerns in several ways. One concern about pricing algorithms is that they may increase competitors' ability and incentive to effectively engage in price fixing in a broader set of circumstances than

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<sup>2</sup> E.g. Competition & Markets Authority, *Pricing Algorithms* § 2.1 (CMA94 2018).

<sup>3</sup> HERBERT HOVENKAMP & PHILLIP E. AREEDA, *ANTITRUST LAW: AN ANALYSIS OF ANTITRUST PRINCIPLES AND THEIR APPLICATION* ¶ 1902 (2023).

<sup>4</sup> *U.S. v. Socony-Vacuum Oil Co.*, 310 U.S. 150 (1940).

is possible without them. For example, former FTC officials have noted that algorithms may facilitate the stability of certain price-fixing agreements by enabling companies to monitor prices to more quickly detect, and respond to, attempts to cheat on the collusive pricing agreement.<sup>5</sup> Another concern is that they could “reduce the need for individuals in firms to communicate in order to maintain a previously coordinated collusive strategy, which might reduce the evidence available to prove the existence of collusion.”<sup>6</sup>

An early case example of how pricing algorithms can facilitate collusion is the Poster Cartel cases. David Topkins, the founder of a company selling posters online, admitted that he had explicitly agreed with employees of competing poster sellers to fix and maintain the prices of certain posters on Amazon Marketplace.<sup>7</sup> The employees of these companies engaged in direct discussions about the prices of posters and agreed to use a pricing algorithm to implement their price-fixing agreement on Amazon Marketplace. In 2015, Topkins entered into a plea agreement with the United States Department of Justice (“DOJ”), receiving a fine of \$20,000 and no jail time.<sup>8</sup> In 2016, Trod Limited, one of the companies who participated in the poster price fixing conspiracy, also entered into a plea agreement.<sup>9</sup> Further, in 2019, a part owner of Trod Limited was given a prison sentence of six months.<sup>10</sup>

In the Poster Cartel cases, the pricing algorithm was simply a tool to implement an ex ante unlawful agreement among companies to fix prices on an online platform. The price fixing agreement entered into by Topkins and others was unlawful, regardless of their use of a pricing algorithm to effectuate it. However, the cases are notable for being the first DOJ criminal prosecutions in the e-commerce space.

## ***B. Delegation of Pricing Authority to a Common Pricing Algorithm***

Many recent antitrust cases involving the use of pricing algorithms concern alleged delegation of pricing to a third-party provider of software that incorporates pricing algorithms. Generally, these cases involve allegations that multiple industry rivals are using the same third-party algorithm to price their products, allegedly resulting in higher prices and lower output for consumers. Commentators have acknowledged that, in certain circumstances, the ability of the current federal antitrust laws to reach and respond to the potential risks to competition associated with competitors’ use of pricing algorithms in this context is uncertain.<sup>11</sup> Among the challenges is the possibility for there to be no express agreement among competitors to use the same algorithm. Even if competitors’ collective use of a common algorithm yields results that may be consistent with anticompetitive conduct (e.g., lower output and increased prices), the absence of an agreement among them — an essential element of a Sherman Act Section 1 claim — may inhibit the ability of the antitrust laws to redress its effects. For example, express agreements to use a pricing algorithm may exist between individual competitors and a third-party vendor. But absent a finding of an agreement between competitors, a private plaintiff or government enforcer is left with only a collection of rule of reason claims for vertical price-fixing between the individual competitors and the third-party algorithm vendor, a potentially much more daunting endeavor than a single horizontal per se claim involving all competitors who use the algorithm. The DOJ’s Antitrust Division recently indicated an intention to push the bounds of the antitrust laws in this context, arguing in a recently filed statement of interest that “the common delegation of decision making to a common entity” may be sufficient to establish liability under Section 1’s per se standard, even without a prior agreement.<sup>12</sup> However, it is unclear whether courts are likely to adopt the DOJ’s trailblazing interpretation of Section 1. Further, it can be more difficult to demonstrate the requisite harm to competition when only one competitor’s use of a pricing algorithm is under scrutiny.

### **1. Joint Delegation**

The United States Supreme Court has held that an explicit agreement among competitors is not necessary to find that a conspiracy existed when circumstantial evidence supports the inference of an agreement. In *Interstate Circuit v. United States*,<sup>13</sup> the manager of two movie theater companies sent identical letters to eight national film distributors, noting in the letter that the same letter was going to each of them, requesting that the

5 Terrell McSweeney & Brian O’Dea, *The Implications of Algorithmic Pricing for Coordinated Effects Analysis and Price Discrimination Markets in Antitrust Enforcement*, in 32 ANTITRUST 75, 75-81 (2017).

6 David Smith & Steven Tadelis, *Algorithmic Pricing: What Every Antitrust Lawyer Needs to Know*, in 22 THE PRICE POINT 1 (2021).

7 Plea Agreement, *U.S. v. Topkins*, No. CR 15-00201 (N.D. Cal. 2015), <https://www.justice.gov/d9/atr/case-documents/attachments/2015/04/30/313686.pdf>.

8 *Id.*

9 Plea Agreement, *U.S. v. Trod Limited*, No. CR 15-0419 (N.D. Cal. 2016), <https://www.justice.gov/d9/327965.pdf>.

10 Press Release, U.S. Dep’t of Justice, Former E-Commerce Executive Pleads Guilty to Price Fixing; Sentenced to Six Months (January 28, 2019).

11 See e.g., *Examining Competition and Consumer Rights in Housing Markets Before Senate Comm. on the Judiciary Subcomm. on Competition Pol’y, Antitrust, & Consumer Rts.*, (2023)(Testimony of Maurice E. Stucke) (hereinafter referred to “Testimony of Maurice E. Stucke”).

12 Mem. of Law in Supp. of the Statement of Interest of the United States, *In re RealPage Antitrust Litig.*, No. 3:23-MD-3071, 5-6, ECF No. 628 (hereinafter referred to as “*In re RealPage*, ECF No. 628”).

13 306 U.S. 208 (1939).

distributors put various restrictions on secondary runs of certain films. Each of the distributors subsequently imposed the requested restrictions. The Supreme Court held that an invitation proposing collective action followed by a course of conduct among competitors showing acceptance suffices to show concerted action: “[A]cceptance by competitors, *without previous agreement*, of an invitation to participate in a plan . . . is sufficient to establish an unlawful conspiracy under the Sherman Act.”<sup>14</sup> This is an example of a “hub-and-spoke” antitrust conspiracy, where rivals use a third party to facilitate their collusion. Since *Interstate Circuit*, federal courts of appeal have in certain circumstances recognized this method for showing concerted action in the absence of an express agreement,<sup>15</sup> though many lower court decisions have acknowledged that that decision has been the subject of criticism and involved facts uncommonly found in other alleged horizontal conspiracies.<sup>16</sup>

Recently, private plaintiffs and enforcers have invoked this 80+ year old precedent and its progeny in the context of algorithmic collusion claims in an attempt to satisfy the first element of a Sherman Act Section 1 claim: the existence of a “contract, combination . . . or conspiracy.”<sup>17</sup> *In re: RealPage, Inc., Rental Software Antitrust Litigation (No. II)*<sup>18</sup> is the consolidated lawsuit of more than 20 separate lawsuits alleging that technology company RealPage, Inc. conspired with multifamily and student housing property managers to artificially inflate rental prices paid by tenants through the defendants’ common use of RealPage’s pricing algorithm. The defendants moved to dismiss the complaint, arguing (among other things) that the property managers’ alleged use of the same pricing algorithm was insufficient to plead the requisite horizontal agreement needed to state a Section 1 claim. While the plaintiffs argued that their complaint includes sufficient direct evidence of a horizontal agreement, they also argued that even if the court were to find such allegations lacking, “Defendants’ acceptance of RealPage’s ‘invitation to participate in a plan, the necessary consequence of which, if carried out, is restraint of commerce, is sufficient to establish an unlawful conspiracy . . . .”<sup>19</sup> Analogizing their case to the facts of *Interstate Circuit*, the *RealPage* plaintiffs pointed to allegations of RealPage publicly offering an invitation to property manager defendants to share their non-public and competitively sensitive data with RealPage in exchange for an increase in rental revenue, and the property managers’ acceptance of that offer.

In November 2023, the DOJ filed a Statement of Interest<sup>20</sup> in *RealPage* in support of the plaintiffs’ position and in opposition to the defendants’ motion to dismiss. DOJ argued that landlords providing confidential pricing data to a common algorithm on the belief that their competitors would do the same, is sufficient to state a price-fixing claim in violation of the Sherman Act, noting that “[i]t makes no difference that the confidential pricing information was shared through an algorithm rather than through ‘a guy named Bob.’”<sup>21</sup> DOJ argued that there are many types of concerted action and many ways of proving it, invoking *Interstate Circuit* and other case law in arguing that concerted action under the Sherman Act includes any type of concerted action that deprives the marketplace of independent centers of decision-making, and that such action can be shown by an invitation followed by conduct showing acceptance.<sup>22</sup> Defendants responded that, even under *Interstate Circuit*, plaintiffs relying on circumstantial evidence of conspiracy must still provide “plus factors” to support their allegations that the actions of defendants are not independent.<sup>23</sup>

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14 *Id.* at 227 (emphasis added).

15 See e.g. *James R. Snyder Co. v. Assoc. Gen. Contractors of Am., Detroit Chapter, Inc.*, 677 F.2d 1111, 1121-22 (6th Cir. 1982) (quoting *Interstate Circuit* to explain that “[a]cceptance by competitors, without previous agreement, of an invitation to participate in a plan, the necessary consequence of which, if carried out, is restraint of interstate commerce, is sufficient to establish an unlawful conspiracy under the Sherman Act”); *U.S. v. Moody*, 787 F. App’x 857, 870 (6th Cir. 2019) (describing a “classic hub-and-spoke conspiracy” as one where “concerted action was contemplated and invited,” and where each participant “knew that cooperation was essential”); *In re Ins. Brokerage Antitrust Litig.*, 618 F.3d 300, 331-32 (3d Cir. 2010) (considering whether, under *Interstate Circuit*, defendants’ decisions “presuppose concerted action”); *PLS.Com, LLC v. Nat’l Ass’n of Realtors*, 32 F.4th 824, 843 (9th Cir. 2022) (“All that PLS must allege is that [the defendant] adhered to a common scheme.”) (citing *Interstate Circuit*, 306 U.S. at 227); *Toys R Us, Inc. v. FTC*, 221 F.3d 928, 935-36 (7th Cir. 2000) (citing *Interstate Circuit* and inferring agreement among competitors in part “from the nature of the proposals [made by an intermediary], from the manner in which they were made,” and “from the substantial unanimity of action taken”); *U.S. v. Foley*, 598 F.2d 1323, 1331-32 (4th Cir. 1979) (citing *Interstate Circuit* and upholding price-fixing convictions where competitors raised prices after a host announced to his competitor guests that, though he “did not care what the others did,” he planned to increase prices).

16 See e.g. *White v. R.M. Packer Co.*, 635 F.3d 571, 576 (1st Cir. 2011); *In re Ins. Brokerage Antitrust Litig.*, 618 F.3d 300, 331-32 (3d Cir. 2010); *In re Travel Agent Comm’n Antitrust Litig.*, 583 F.3d 896, 906 (6th Cir. 2009); *Barry v. Blue Cross of Cal.*, 805 F.2d 866, 869 (9th Cir. 1986); *Program Eng’g, Inc. v. Triangle Publ’ns, Inc.*, 634 F.2d 1188, 1195 (9th Cir. 1980).

17 15 U.S.C. § 1.

18 No. 3:23-MD-3071 (M.D. Tenn.).

19 Pls.’ Mem. of Law in Opp’n to Defs. Mot. to Dismiss, *In re RealPage Antitrust Litig.*, No. 3:23-MD-3071 (M.D. Tenn.), 9, ECF No. 623 (quoting *Interstate Circuit*, 306 U.S. at 227).

20 *In re RealPage*, ECF No. 628, *supra* note 12.

21 *In re RealPage*, ECF No. 628, *supra* note 12, at 21 (quoting Maureen K. Ohlhausen, *Should We Fear The Things That Go Beep In the Night? Some Initial Thoughts on the Intersection of Antitrust Law and Algorithmic Pricing*, FEDERAL TRADE COMMISSION, at 10 (May 23, 2017).

22 See *id.* at 5-12.

23 Defs.’ Opp’n to the Department of Justice’s Mem. of Law in Supp. of the Statement of Interest of the United States, *In re RealPage Antitrust Litig.*, No. 3:23-MD-3071 (M.D. Tenn.), ECF No. 644.

Ultimately, the Court agreed with the *RealPage* plaintiffs, identifying the “most persuasive evidence of horizontal agreement is the simple undisputed fact that each [property manager] provided RealPage its proprietary commercial data, knowing that RealPage would require the same from its horizontal competitors and use all of that data to recommend rental prices to its competitors.”<sup>24</sup> The Court concluded that the lessors’ alleged use of RealPage’s software was sufficient to constitute parallel conduct at the Rule 12 stage.<sup>25</sup> Notably, the Court did not address (or even acknowledge) the DOJ’s Statement of Interest, nor its argument that “concerted action” short of an agreement can establish liability under Section 1 of the Sherman Act.

Other lawsuits involving allegations of algorithmic collusion by participants in the multifamily housing and hotel industries are currently working their way through the courts. In *Gibson v. MGM Resorts Int’l*, plaintiffs allege that hotel operators on the Las Vegas Strip violated Section 1 of the Sherman Act by artificially inflating the price of hotel rooms after agreeing to all use pricing software marketed by the same company.<sup>26</sup> The court dismissed plaintiffs’ claims without prejudice in October 2023, concluding that the plaintiffs had failed to allege facts plausibly suggesting that the hotel operators each agreed to use the same pricing algorithm and had failed to allege that the hotel operators “are required to accept the prices that the unspecified pricing software recommends to them,” making it impossible for the court to infer that there was an agreement “to accept the elevated prices recommended by the pricing algorithm.”<sup>27</sup> Plaintiffs filed their first amended complaint in November 2023.<sup>28</sup>

In *Duffy v. Yardi Systems, Inc. et al.*, plaintiffs accuse a property management software company and several apartment lessors of orchestrating a nationwide scheme to fix the cost of multifamily apartment rental rates, alleging that the lessor defendants used a common pricing algorithm to fix rental rates and exchanged competitively sensitive, non-public information through that automated pricing software.<sup>29</sup> Defendants filed motions to dismiss in December 2023, arguing *inter alia* that the plaintiffs’ allegations of the lessors’ common use of the same pricing algorithm were insufficient to allege a horizontal agreement among the apartment lessors.<sup>30</sup> Defendants’ motions remain pending as of this writing.

## 2. Unilateral Delegation

Another scenario involves a series of vertical agreements between a third-party provider of a pricing algorithm and several industry rivals that independently decide to use the same algorithm. Here, the hub-and-spoke model does not apply: while these arrangements consist of vertical agreements between the third-party vendor (the hub) and each industry rival (the spokes), what is missing is the requisite horizontal agreement between those rivals to adhere to the hub’s terms. In the parlance of the hub-and-spoke conspiracy, there is no “rim.” The Supreme Court has “made clear that a rimless wheel conspiracy is not a single, general conspiracy but instead amounts to multiple conspiracies between the common defendant and each of the other defendants.”<sup>31</sup> Faced with a rimless wheel conspiracy, plaintiffs are relegated to the often more challenging task of pursuing a series of individual vertical conspiracy claims under the rule of reason standard<sup>32</sup> instead of a combined, horizontal price-fixing claim under the per se standard.

In both the *Duffy v. Yardi Systems, Inc.* and *Gibson v. MGM Resorts Int’l* cases discussed above, plaintiffs assert separate Section 1 claims for a “set of vertical agreements” to be analyzed under the rule of reason. While these plaintiffs allege that each individual agreement at issue had the anticompetitive effect of artificially raising prices, they also allege that, *in the aggregate*, the set of vertical agreements together inflated prices in their alleged relevant market. The courts in these cases have not yet addressed this issue, and there are decisions adopting somewhat different rules regarding whether and when aggregation of a series of vertical agreements to allege anticompetitive effects may be permitted.<sup>33</sup>

<sup>24</sup> *In re RealPage, Inc.*, 2023 WL 9004806, at \*15 (M.D. Tenn. Dec. 28, 2023).

<sup>25</sup> *Id.* at \*27.

<sup>26</sup> No. 2:23-cv-00140-MMD-DJA (D. Nev.).

<sup>27</sup> *Gibson v. MGM Resorts Int’l*, 2023 WL 7025996, at \*3 (D. Nev. Oct. 24, 2023).

<sup>28</sup> Am. Compl., *Gibson v. MGM Resorts Int’l*, No. 2:23-cv-00140-MMD-DJA (D. Nev.), ECF No. 144.

<sup>29</sup> No. 2:23-cv-1391 (D. Wash.).

<sup>30</sup> Defs.’ Omnibus Mot. to Dismiss the First Am. Class Action Compl. Pursuant to FRCP 12(b)(6), *Duffy v. Yardi Systems, Inc. et al.*, No. 2:23-cv-01391-RSL (D. Wash.), ECF No. 138.

<sup>31</sup> *Dickenson v. Microsoft Corp.*, 309 F.3d 193 (4th Cir. 2002) (citing *Kotteakos v. U.S.*, 328 U.S. 750, 755 (1946)).

<sup>32</sup> See *Leegin Creative Leather Prods., Inv. v. PSKS, Inc.*, 551 U.S. 877, 890-94 (2007) (holding that vertical price restraints establishing minimum resale prices should be analyzed under the rule of reason); *In re Amazon.com, Inc. eBook Antitrust Litig.*, 2023 WL 6006525, at \*6 (July 31, 2023) (vertical distribution agreements subject to a rule-of-reason analysis).

<sup>33</sup> See e.g. *Maris Distrib. Co. v. Anheuser-Busch, Inc.*, 302 F.3d 1207 (11th Cir. 2002) (outside of group boycott context, aggregation of individual vertical restraints by manufacturer on distributors is inappropriate); *Dickenson*, *supra* note 31 (only acts taken in furtherance of a given vertical conspiracy are appropriately considered in determining the adverse effects of the claimed restraints on trade, not acts of one conspirator taken in furtherance of other possible, distinct conspiracies); *In re Amazon.com*, *supra* note 32 (aggregation of vertical claims inappropriate to show market power); but see *Brown v. Amazon.com, Inc.*, 2023 WL 5793303 (W.D. Wash., Sept. 7, 2023) (plaintiffs’ aggregation of alleged anticompetitive effects caused by individual minimum margin agreements was proper).

### C. Tacit Collusion Via Pricing Algorithms

Perhaps the most extensively studied competition issue involving pricing algorithms is the possibility of tacit collusion. Definitions of tacit collusion vary, but the United States Supreme Court has described it as “the process . . . 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.”<sup>34</sup> As the DOJ explained in its Statement of Interest in the *RealPage* litigation, tacit collusion is not synonymous with a “tacit agreement.” The former describes unilateral conduct outside the scope of Section 1, whereas current federal antitrust case law treats the latter as concerted action subject to Section 1.<sup>35</sup>

Tacit collusion has most often been evaluated in relatively concentrated, oligopolistic markets because the need to monitor and effectively respond to pricing actions taken by competitors becomes more difficult as the number of market participants increases.<sup>36</sup> But advancements in technology, including pricing algorithms’ use of artificial intelligence and machine learning, have caused regulators to grow increasingly focused on addressing potential tacit collusion in less concentrated markets. DOJ Principal Deputy Assistant Attorney General Doha Mekki has stated that DOJ “is concerned with and closely scrutinizing the use of pricing algorithms and other artificial intelligence technology capable of analyzing large amounts of data and predicting competitors’ strategies” because “[s]everal studies have shown that these algorithms can lead to tacit or express collusion in the marketplace, potentially resulting in higher prices, or at a minimum, a softening of competition.”<sup>37</sup> Susan Athey, the Chief Economist of the DOJ’s Antitrust Division, similarly identified the possibility of tacit collusion through use of artificial intelligence-powered algorithms in less concentrated markets to be an area of increased focus and scrutiny.<sup>38</sup> And Ryan Tansey, the Chief of the DOJ Antitrust Division’s Washington Criminal I Section, suggested that pricing algorithms enable coordination in “large, decentralized markets.”<sup>39</sup>

Notably, while the potential anticompetitive effects of tacit collusion by pricing algorithms are attracting increased scrutiny from regulators, the level of empirical support for these concerns in current, real-world economic conditions is unclear. A recent study suggests that the potential for stable, supracompetitive pricing through use of pricing algorithms decreases significantly when the number of market participants increases from two to four,<sup>40</sup> and that use of pricing algorithms in markets with nine or more sellers resulted in fierce competition and lower prices.<sup>41</sup>

The potential that sophisticated, artificial intelligence-powered pricing algorithms may engage in tacit collusion presents at least two issues that complicate potential enforcement efforts under Section 1. First, Section 1 of the Sherman Act requires an agreement for conduct to be unlawful, and United States Supreme Court precedent indicates that tacit collusion does not amount to an agreement.<sup>42</sup> Second, only “persons” can violate the Sherman Act, and algorithms are not included in the Clayton Act’s definition of “person.”<sup>43</sup>

Nevertheless, regulators recently have sought to address the potential competitive effects of tacit collusion through pricing algorithms in notable ways. The FTC and DOJ’s recently released 2023 Merger Guidelines identify the potential competitive concerns implicated by tacit collu-

34 *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 227 (1993).

35 *In re RealPage*, ECF No. 628, *supra* note 12, at 6 n.4.

36 U.S. Department of Justice and Federal Trade Commission 2023 Merger Guidelines, § 2.3B (“A market is more susceptible to coordination if a firm’s prospective competitive reward from attracting customers away from its rivals will be significantly diminished by its rivals’ likely responses. . . . Some factors that increase the likelihood of strong or rapid responses by rivals include: (1) the market has few significant competitors . . . .”) (hereinafter referred to “2023 Merger Guidelines”); see also Emilio Calvano et al., *Artificial Intelligence, Algorithmic Pricing and Collusion*, 110 *AMERICAN ECONOMIC REVIEW* 3267 (2020); *Brooke Group*, *supra* note 34, at 227.

37 *Principal Deputy Assistant Attorney General Doha Mekki of the Antitrust Division Delivers Remarks at GCR Live: Law Leaders Global 2023*, U.S. DEP’T OF JUST. (Feb. 2, 2023), <https://www.justice.gov/opa/speech/principal-deputy-assistant-attorney-general-doha-mekki-antitrust-division-delivers-0>.

38 Khushita Vasant, *Crackdown on tacit collusion at lower concentration levels may need more antitrust tools, US DOJ chief economist says*, MLEX (Dec. 13, 2023), [https://content.mlex.com/#/content/1530442/crackdown-on-tacit-collusion-at-lower-concentration-levels-may-need-more-antitrust-tools-us-doj-chief-economist-says?referrer=search\\_linkclick](https://content.mlex.com/#/content/1530442/crackdown-on-tacit-collusion-at-lower-concentration-levels-may-need-more-antitrust-tools-us-doj-chief-economist-says?referrer=search_linkclick).

39 Bryan Koenig, *AI Could Expand Price-Fixing To Less Concentrated Markets*, LAW360 (Nov. 9, 2023), [https://www.law360.com/competition/articles/1765541?nl\\_pk=e-7a410b9-a181-42c3-b818-abdf7afa624&utm\\_source=newsletter&utm\\_medium=email&utm\\_campaign=competition&utm\\_content=2023-11-13&read\\_main=1&nlsidx=0&nlsidx=9?copied=1](https://www.law360.com/competition/articles/1765541?nl_pk=e-7a410b9-a181-42c3-b818-abdf7afa624&utm_source=newsletter&utm_medium=email&utm_campaign=competition&utm_content=2023-11-13&read_main=1&nlsidx=0&nlsidx=9?copied=1).

40 Calvano et al., *supra* note 36.

41 Testimony of Maurice E. Stucke, *supra* note 11, at 9 n.40.

42 *Brooke Group*, *supra* note 34, at 227.

43 15 U.S.C. § 12; see also Herbert Hovenkamp, *The Power of Antitrust Personhood*, *UNIV. PENN. J. BUS. L.* (forthcoming), available at [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4352061](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4352061).

sion, and specifically reference how “pricing algorithms” and “programmatic pricing software” can potentially increase the risk of anticompetitive coordination by increasing market observability and the speed of rivals’ pricing responses.<sup>44</sup>

Additionally, the FTC,<sup>45</sup> several state attorneys general, and private plaintiffs have sued Amazon for allegedly using pricing algorithms in ways that potentially involve tacit collusion. Specifically, these plaintiffs have alleged Amazon has used pricing algorithms to both (i) prevent other sellers from decreasing their prices below Amazon’s prices for the same goods and (ii) to increase other sellers’ prices to match Amazon’s own price increases for the same goods. In the former scenario, they allege Amazon developed a proprietary pricing algorithm designed to match other online sellers’ pricing movements, which allegedly had the effect of deterring other online sellers from offering lower prices to attract customers.<sup>46</sup> In the latter scenario, Amazon allegedly developed a proprietary algorithm (“Project Nessie”) that “predicted the likelihood that [other online sellers] would follow an Amazon price increase,” allowing Amazon to increase certain of its products’ prices when it determined other online sellers’ own pricing algorithms would follow suit.<sup>47</sup> The FTC’s complaint claims that in April 2018 alone, “Amazon used Project Nessie to set prices for more than 8 million items purchased by customers that collectively cost almost \$194 million,”<sup>48</sup> and that “from 2016 through 2018, Project Nessie generated over \$1 billion in additional profit for Amazon.”

#### **D. Unilateral Use of Pricing Algorithms**

While the use of pricing algorithms has been less commonly studied in the context of purely unilateral conduct, commentators recently have identified certain scenarios in which pricing algorithms could potentially harm competition or consumers.<sup>49</sup>

One scenario involves price discrimination, which in certain circumstances may be unlawful under the federal Robinson-Patman Act. To establish secondary-line price discrimination (i.e., a buyer’s claim of discriminatory pricing against a seller), a plaintiff must show that (1) the challenged sales were made in interstate commerce; (2) the items sold were of like grade and quality; (3) the seller discriminated in price between the disfavored and the favored buyer; and (4) “the effect of such discrimination may be ... to injure, destroy, or prevent competition’ to the advantage of a favored purchaser.”<sup>50</sup>

Private enforcement under the Robinson-Patman Act has been limited in recent years.<sup>51</sup> And for many years, the FTC had not actively enforced the Robinson-Patman Act, with its most recent case having resulted in settlement in 2000.<sup>52</sup> However, in the past two years the FTC has announced two separate investigations into soft drink and alcohol distribution, respectively.<sup>53</sup> And a defense verdict in a private lawsuit involving energy drinks recently was overturned in part by the United States Ninth Circuit Court of Appeals.<sup>54</sup> Notably, many courts and commentators have criticized the Robinson-Patman Act as being inconsistent with the goals of the other antitrust laws, including because that Act’s competitive injury requirement does not necessarily require showing that a market “is susceptible to higher prices, reduced output, or other indicia of monopoly or oligopoly.”<sup>55</sup>

Commentators have identified how, through the use of sophisticated data collection and analysis, companies have the ability to develop algorithms that can tailor prices for specific products based on a buyer’s individual willingness to pay at a particular point in time.<sup>56</sup> This in theory

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44 2023 Merger Guidelines, *supra* note 36, at § 2.3B.

45 Notably, the FTC sued Amazon for allegedly violating Section 5 of the FTC Act, which makes illegal “unfair or deceptive acts or practices” that need not necessarily comply with the Sherman Act’s requirements in order to be unlawful.

46 *FTC v. Amazon.com, Inc.*, No. 2:23-cv-01495-JHC (W.D. Wash.), ¶¶20-21, 333-337, ECF No. 114.

47 *Id.* at ¶¶ 419, 420.

48 *Id.* at ¶ 422.

49 E.g. Christopher R. Leslie, *Predatory Pricing Algorithms*, 98 N.Y.U. L. Rev. 49 (2023); Thomas K. Cheng & Julian Nowag, *Algorithmic Predation and Exclusion*, 25 U. Pa. J. Bus. 41 (2023).

50 *Volvo Trucks N. Am., Inc. v. Reeder-Simco GMC, Inc.*, 546 U.S. 164, 176-77 (2006) (quoting 15 U.S.C. § 13(a)).

51 *U.S. Wholesale Outlet & Distrib. v. Inno. Ventures, LLC*, 74 F.4th 960 (9th Cir. 2023).

52 Press Release, Fed. Trade Comm’n, World’s Largest Manufacturer of Spice and Seasoning Products Agrees to Settle Price Discrimination Charges (Mar. 8, 2000).

53 Josh Sisco, *Pepsi, Coke Soda Pricing Targeted in New Federal Probe*, *POLITICO* (Jan. 9, 2023), <https://www.politico.com/news/2023/01/09/pepsi-coke-soda-federal-probe-00077126>; *Southern Glazer’s Wine and Spirits*, *FED TRADE COMM’N* (Apr. 7, 2023), <https://www.ftc.gov/legal-library/browse/cases-proceedings/petitions-quash/southern-glazers-wine-spirits>.

54 *U.S. Wholesale*, *supra* note 51.

55 HOVENKAMP & AREEDA, *supra* note 3, at ¶ 2330.

56 Salil K. Mehra, *Price Discrimination-Driven Algorithmic Collusion: Platforms for Durable Cartels*, 26 *STAN. J.L. BUS. & FIN.* 171 (2021).



could conceivably allow producers of goods to transfer what formerly was consumer surplus to producers, decreasing consumer welfare.<sup>57</sup> And depending on the facts, this price discrimination could violate the Robinson-Patman Act.

Another scenario involves the use of pricing algorithms to implement a predatory pricing strategy. The United States Supreme Court has stated that a company may be liable for engaging in predatory pricing when (1) its prices are below an appropriate measure of costs in the short term, and (2) it has a dangerous probability of recouping its investment in below-cost prices.<sup>58</sup>

Many court opinions and commentators have suggested that predatory pricing often is implausible in practice due to its high costs and low probability of success, though that view is not universally held.<sup>59</sup> But recently, commentators have suggested that pricing algorithms may be able to more effectively implement predatory pricing strategies.<sup>60</sup> For example, some commentators have noted that pricing algorithms could engage in price discrimination by tailoring pricing strategies so that only competitors' customers received below-cost prices, thereby reducing a monopolist's costs of implementing a predatory strategy.<sup>61</sup> They have also suggested that pricing algorithms may be able to more effectively "commit" to a predatory strategy, without being swayed by the unease a human may feel when faced with the temporary losses associated with implementing such a strategy.<sup>62</sup> And they have suggested that there are various factors, such as the speed at which pricing algorithms can respond to competitors' pricing and potential network effects, that may be more likely to prevent reentry by a rival who exited a market as a result of predatory pricing.<sup>63</sup>

A final scenario involves the potential use of pricing algorithms to price discriminate among customers in order to tailor exclusionary rebates to specific customers, or to pursue tying and bundling schemes.<sup>64</sup> As with predatory pricing, current antitrust doctrine and conventional economic analysis require a monopolist to have a viable means of recouping the costs associated with offering rebates to customers, or with making tying and bundling schemes profitable. The ability of pricing algorithms to target individual customers and to selectively offer different prices, in different circumstances, at different times, could decrease the costs associated with engaging in potentially anticompetitive conduct, and thus potentially make anticompetitive schemes more profitable in the near to medium term (and thus make monopolists more likely to pursue them).<sup>65</sup>

## IV. CONCLUSION

Pricing algorithms have become widely used, welfare-enhancing tools that allow businesses to compete more efficiently and effectively. And their use is likely to increase as more data and more sophisticated data analysis tools become more broadly available. As a result, understanding the various ways in which pricing algorithms can implicate competition issues will continue to be the subject of antitrust enforcement, litigation, and study, with courts being the ultimate arbiters of their legality under the United States antitrust laws.

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<sup>57</sup> *Id.*

<sup>58</sup> *Brooke Group*, *supra* note 34, at 222-24.

<sup>59</sup> *Leslie*, *supra* note 49, at 53.

<sup>60</sup> *Id.*; see also *Cheng*, *supra* note 49.

<sup>61</sup> *Leslie*, *supra* note 49, at II.B.1.

<sup>62</sup> *Id.* at II.B.2.

<sup>63</sup> *Id.* at II.B.3; see also *SC Innovations, Inc. v. Uber Techs., Inc.*, 2020 WL 2097611, at \*10 (N.D. Cal. May 1, 2020).

<sup>64</sup> *Cheng*, *supra* note 49.

<sup>65</sup> *Cheng*, *supra* note 49.



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