No. 24-3006

IN THE UNITED STATES COURT OF APPEALS
FOR THE THIRD CIRCUIT

CORNISH-ADEBIYI, ET AL. ,
Plaintiffs-Appellants,
v.
CAESARS ENTERTAINMENT, INC. , ET AL.,
Defendants-Appellees

On Appeal from the United States District Court
for the District of New Jersey, No. 1:23-CV-02536

BRIEF FOR THE AMERICAN ANTITRUST INSTITUTE AS AMICUS CURIAE IN SUPPORT OF PLAINTIFFS-APPELLANTS AND REVERSAL

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Pursuant to Appellate Rule 26.1(a), the American Antitrust Institute states that it is a nonprofit, non-stock corporation. It has no parent corporations, and no publicly traded corporations have an ownership interest in it.

TABLE OF CONTENTS

TABLE OF AUTHORITIES

CASES **PAGE**

STATUTES

OTHER AUTHORITIES

INTEREST OF AMICUS CURIAE[1]

The American Antitrust Institute ("AAI") is an independent nonprofit organization devoted to promoting competition that protects consumers, businesses, and society. It serves the public through research, education, and advocacy on the benefits of competition and the use of antitrust enforcement as a vital component of national and international competition policy. AAI enjoys the input of an Advisory Board that consists of over 130 prominent antitrust lawyers, law professors, economists, and business leaders. See http://www.antitrustinstitute.org.[2]

[1] All parties have consented to the filing of this amicus brief. No counsel for a party has authored this brief in whole or in part, and no party, party's counsel, or any other person—other than amicus curiae or its counsel—has contributed money that was intended to fund preparing or submitting this brief.

[2] Individual views of members of AAI's Board of Directors or Advisory Board may differ from AAI's positions. Certain members of AAI's Advisory Board, or their law firms, represent Plaintiffs-Appellants, but they played no role in AAI's deliberations with respect to the filing of the brief.

INTRODUCTION AND SUMMARY OF ARGUMENT

We are in the early days of a transformation of our economy driven by the widespread use of cutting-edge software powered by machine learning and artificial intelligence ("AI").[3] AI can speed up innovation, lower entry barriers, maximize production, and facilitate price competition.[4] But it can also create or enhance market power, thwart new entrants, raise prices, and reduce output.[5] Specifically, there is a consensus among researchers and antitrust enforcers that AI can enable firms to coordinate pricing and output decisions without expressly agreeing with each other to do so.[6] Luckily, antitrust law provides adaptable tools

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[3] *See, e.g.*, Ariel Ezrachi & Jay Modrall, *Rising to the challenge – competition law and the digital economy*, 15 COMPETITION L. INT'L 117 (2019) (discussing antitrust crossroad posed by "the rapid evolution of the digital economy" and stating that "[t]he choices we make will impact future prosperity, determine the dynamics of digital markets and the distribution of wealth in society").

[4] *See* Emilio Calvano, Giacomo Calzolari, Vincenzo Denicolò & Sergio Pastorello, *Algorithmic Pricing: What Implications for Competition Policy?*, 55 REV. INDUS. ORG. 155, 168 (2018) ("[T]here is a wide consensus that algorithms may deliver big efficiency gains by allowing more efficient pricing.").

[5] *See, e.g.*, Ariel Ezrachi & Maurice E. Stucke, *Artificial Intelligence & Collusion: When Computers Inhibit Competition*, 2017 U. ILL. L. REV. 1775, 1781–96 (2017) (exploring ways in which AI can foster collusion, including through algorithm-fueled hub-and-spoke theory); Emilio Calvano, Giacomo Calzolari, Vincenzo Denicolò, Joseph E. Harrington Jr. & Sergio Pastorello, *Policy Forum: Protecting consumers from collusive prices due to AI*, 370 SCIENCE 1040, 1040–41 (2020) (discussing theoretical basis and empirical evidence of algorithmic collusion).

[6] *See, e.g.*, Michal S. Gal, *Limiting Algorithmic Coordination*, 38 BERKELEY TECH. L.J. 173, 182, 229 (2023) ("[T]here is growing and strong consensus that some algorithms operating in today's digital ecosystem can indeed overcome some barriers to coordination . . . and raise prices."); Kevin T. White & Tammy W.

to distinguish procompetitive from anticompetitive uses of new technology and to identify tacit agreements to collude.[7] But for those tools to be effective, courts must not shoehorn AI into legal frameworks designed for outdated technologies. They must focus on "competitive reality" rather than "formalistic distinctions." *Am. Needle, Inc. v. Nat'l Football League*, 560 U.S. 183, 191, 196 (2010).

In this algorithmic price-fixing case, the district court took the wrong approach. Plaintiffs allege that: (1) the Casino-Hotel Defendants knowingly shared

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Cowart, *Behind the Cloaking Device: Is There an Anti-Competitive Agreement Lurking Under the Use of Common Pricing Algorithms by Multifamily Landlords?*, 63 WASHBURN L.J. 287, 306–11 (2024) ("It is beyond debate that pricing algorithms can violate the Sherman Act by price fixing, colluding, and creating horizontal agreements.") (cleaned up) (quoting David Krieghbaum Jr., *Algorithms Take Flight: Modern Pricing Algorithms' Effect on Antitrust Laws in the Aviation Industry*, 32 LOY. CONSUMER L. REV. 282, 291 (2020)); 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* 10 (May 23, 2017), *available at* https://perma.cc/8KZF-HQE3 (describing algorithmic price-fixing schemes as traditional "hub-and-spoke" conspiracies); Plaintiffs-Appellants' Br. 53–56; A-552–610 (governments' statements of interest in this case, *In re RealPage, Inc., Rental Software Antitrust Litig. (No. II)*, 709 F. Supp. 3d 478 (M.D. Tenn. 2023), and *Duffy v. Yardi Systems, Inc.*, No. 2:23-cv-01391-RSL, 2024 U.S. Dist. LEXIS 219629 (W.D. Wash. Mar. 1, 2024)).

[7] *See, e.g.*, Ariel Ezrachi & Maurice E. Stucke, *Sustainable and Unchallenged Algorithmic Tacit Collusion*, 17 NW. J. TECH. & INTELL. PROP. 217, 219 (2020) (noting "general consensus" that algorithm-fueled "hub and spoke" conspiracy, "where a common intermediary facilitates price-fixing among competitors who use the intermediary's services," violates antitrust laws); John A. Fortin, *Algorithms and Conscious Parallelism: Why Current Antitrust Doctrine is Prepared for the Twenty-First Century Challenges Posed by Dynamic Pricing*, 23 TUL. J. TECH & INTELL. PROP. 1, 15–33 (2021) (examining case law and concluding that "Ezrachi & Stucke's Algorithm-Fueled Hub and Spoke conspiracy could be countered, as they agree, through traditional methods").

current, non-public, commercially sensitive information with a common algorithm, (2) the algorithm used that information to make pricing and vacancy recommendations, and (3) the Casino-Hotel Defendants' near-universal acceptance of those recommendations reduced hotel room occupancy and raised hotel room prices. A-211–15, A-217–18 (¶¶ 6, 9, 11–12, 15–16, 24); Plaintiffs-Appellants' Br. 14–19. Yet the district court ignored that concerted activity and its effects on prices and output, finding that the scheme could not have been unlawful because the Casino-Hotel Defendants started using the algorithm at different times, did not directly share non-public information with each other, and retained the ability to override the algorithm's recommendations. A-3–4, A-8–13. The court derived these requirements from traditional "plus factors" that courts have used in the past to identify human collusion, but that are not well suited to identifying algorithmic collusion. It also overlooked a key plus factor: the Casino-Hotel Defendants acted against their own interests by sacrificing room occupancy and sharing non-public pricing and occupancy information with a third party that they knew was making price and output recommendations to their competitors. And it ignored Plaintiffs' allegations that Cendyn's algorithm used each Casino-Hotel Defendant's non-public pricing and occupancy data to make pricing recommendations to the others, putting the burden on Plaintiffs to allege specifically how Cendyn's algorithm processes each Casino-Hotel Defendant's non-public pricing and occupancy data.

By requiring that algorithmic collusion demonstrate the hallmarks of human collusion, the district court erred. Its opinion provides a roadmap for evading antitrust scrutiny and effectively immunizes cartels that fix prices using AI. That is a dangerous precedent to set, particularly as AI increasingly pervades our economy.[8] This Court should reverse.

ARGUMENT

Section 1 of the Sherman Act declares illegal "[e]very contract, combination . . . or conspiracy, in restraint of trade." 15 U.S.C. § 1. The Supreme Court has explained that this statutory language "cannot mean what it says," because "restraint is the very essence of every contract." *Nat'l Soc'y of Pro. Eng'rs v. United States*, 435 U.S. 679, 687–88 (1978). Courts therefore read Section 1 as prohibiting only contracts, combinations or conspiracies that restrain trade "unreasonably," a determination focusing on "whether the challenged agreement is one that promotes competition or one that suppresses competition." *Id.* at 690–91 (citing *Chi. Bd. of Trade v. United States*, 246 U.S. 231, 238 (1918)).

Because "[t]he purpose of the analysis is to form a judgment about the competitive significance of the restraint," *id*. at 692, the Supreme Court has long

[8] "[A]lmost any market can be cartelized if the law permits sellers to establish formal, overt mechanisms for colluding." *In re High Fructose Corn Syrup Antitrust Litig.*, 295 F.3d 651, 655 (7th Cir. 2002) (Posner, J.); *see also* Herbert Hovenkamp & Christopher R. Leslie, *The Firm as Cartel Manager*, 64 VAND. L. REV. 813, 859–72 (2011) (discussing case studies of cartel formation).

elevated function over form in conducting the inquiry, repeatedly emphasizing that "the legality of arguably anticompetitive conduct" is judged by "market impact" and "economic effect." *Monsanto Co. v. Spray-Rite Serv. Corp.*, 465 U.S. 752, 762 (1984); *Am. Needle*, 560 U.S. at 191, 196 ("We have eschewed . . . formalistic distinctions in favor of a functional consideration of how the parties involved in the alleged anticompetitive conduct actually operate"; "the inquiry is one of competitive reality."); *see also* Hovenkamp & Leslie, *supra* n.8 at 850 ("The emphasis of substance over form is critical when analyzing cartels."). And because "Congress designed the Sherman Act as a 'consumer welfare prescription,'" *Reiter v. Sonotone Corp.*, 442 U.S. 330, 343 (1979) (quoting ROBERT H. BORK, THE ANTITRUST PARADOX 66 (1st ed. 1978)), "the importance of consumer preference in setting price and output" is "fundamental" to the inquiry. *Nat'l Collegiate Athletic Ass'n. v. Bd. of Regents of Univ. of Okla.*, 468 U.S. 85, 107 (1984) [hereinafter "*NCAA*"]; *accord Nat'l Soc'y of Pro. Eng'rs*, 435 U.S. at 688.

Courts take one of two approaches in deciding whether conduct is unreasonable. Some agreements—such as horizontal price-fixing or market-allocation agreements—so obviously undermine the role of consumer preference in setting price and output that courts deem them unreasonable without further inquiry; they are said to be *per se* illegal. *Nat'l Soc'y of Pro. Eng'rs*, 435 U.S. at 692. Other agreements are subject to a more searching analysis under the rule of

reason; they require a determination of whether the agreement's anticompetitive effects are outweighed by procompetitive benefits that could not have been achieved through less restrictive means. *King Drug Co. of Florence, Inc. v. SmithKline Beecham Corp.*, 791 F.3d 388, 412 (3d Cir. 2015).[9]

The district court took two wrong turns in its analysis. First, it focused not functionally on whether the Casino-Hotel Defendants' parallel information sharing, price increases, and occupancy reductions suggested a tacit horizontal agreement, but formally on whether the plus factors indicative of an express human agreement were present. Adopting the reasoning of *Gibson v. Cendyn Group, LLC*, No. 2:23-cv-00140-MMD-DJA, 2024 U.S. Dist. LEXIS 83547 (D. Nev. May 8, 2024) ("*Gibson II*"), the Court determined that a horizontal agreement among the Casino-Hotel Defendants was implausible because their vertical agreements with Cendyn were spread apart in time, they did not directly share non-public information with each other, and they retained the ability to override the algorithm's recommendations. A-7–13.

[9] By alleging that Cendyn acted as an intermediary to facilitate a horizontal price-fixing agreement among the Casino-Hotel Defendants, Plaintiffs pleaded a *per se* claim. *See United States v. Socony-Vacuum Oil Co.*, 310 U.S. 150, 223 (1940); Plaintiffs-Appellants' Br. 53–56; A-552–65. By alleging vertical agreements between the Casino-Hotels and Cendyn, that the Casino-Hotel Defendants have over 70% market share, and that the agreements had actual detrimental effects in the form of reduced hotel occupancy and higher room prices, Plaintiffs pleaded a rule of reason claim. *See LifeWatch Servs. v. Highmark Inc.*, 902 F.3d 323, 336 (3d Cir. 2018); Plaintiffs-Appellants Br. 56–58.

This analysis sheds no light on Plaintiffs' allegations. The court should have focused on the "competitive reality" that, because AI enables firms to effectively coordinate on price and output in ways that humans cannot, algorithmic collusion may not be accompanied by the same plus-factor evidence as human collusion. *Am. Needle*, 560 U.S. at 196. It also should have recognized that the Casino-Hotel Defendants acted against their economic interest by reducing output—a well-established plus factor that plausibly suggests an agreement. *Interstate Circuit, Inc. v. United States*, 306 U.S. 208, 222–23 (1939); *see also In re Ins. Brokerage Antitrust Litig.*, 618 F.3d 300, 331–32, 346 & n.47 (3d Cir. 2010) (discussing cases).

The district court's second misstep was to fail to consider whether the Casino-Hotel Defendants' agreements with Cendyn were unlawful vertical restraints. It assumed that Plaintiffs' allegations were deficient to the extent they relied on vertical rather than horizontal agreements. A-13 ("Without . . . context [suggesting a horizontal agreement,] the Casino-Hotels' use of the same pricing software evinces 'nothing more than a series of vertical relationships.'") (quoting *Ins. Brokerage*, 618 F.3d at 315). But that assumption is erroneous. Antitrust law has long recognized that vertical agreements can unlawfully harm competition, even in the absence of horizontal collusion. *See, e.g.*, *Leegin Creative Leather*

Products, Inc. v. PSKS, Inc., 551 U.S. 877, 898–99 (2007); *Toledo Mack Sales & Serv. v. Mack Trucks, Inc.*, 530 F.3d 204, 216 n.8 (3d Cir. 2008).

I. Courts' Section 1 Analysis Should Reflect the Competitive Realities of AI.

The Supreme Court has long elevated function over form in applying the antitrust laws. *See Appalachian Coals, Inc. v. United States*, 288 U.S. 344, 377 (1933) ("The Anti-Trust Act aims at substance," not "artificial distinction."); *United States v. Yellow Cab Co.*, 332 U.S. 218, 227 (1947) (The Act "is aimed at substance rather than form."); *Eastman Kodak Co. v. Image Tech. Servs., Inc.*, 504 U.S. 451, 466–67 (1992) ("Legal presumptions that rest on formalistic distinctions rather than actual market realities are generally disfavored in antitrust law."). Thus, in determining whether an algorithmic pricing scheme amounts to an anticompetitive agreement under Section 1, the analysis should focus on how the parties "actually operate," considering the "competitive reality" of AI. *Am. Needle*, 560 U.S. at 191, 196.

A. Section 1 seeks to ensure independent centers of economic decisionmaking.

Section 1 reflects Congress's judgment that protecting competition promotes consumer welfare. In an unconcentrated market, self-interested firms each have a strong incentive to compete to attract customers and meet demand. Collectively, their struggle to win market share naturally drives down prices and maximizes

output. But in a concentrated market, this healthy market process can break down. When firms have the ability to increase prices and reduce output without losing market share, they have a strong incentive to reap the resulting supracompetitive profits, just like a monopolist would. *See Blomkest Fertilizer, Inc. v. Potash Corp. of Sask., Inc.*, 203 F.3d 1028, 1042 (8th Cir. 2000) (Gibson, J., dissenting) ("[O]ligopoly pricing harms the consumer in the same way monopoly does.").

Although oligopoly pricing harms consumers, it is nearly impossible to police. Because "any rational decision" by an oligopolist "must take into account the anticipated reaction of the other firms," the only meaningful way to police interdependent pricing is often for courts to set prices themselves, which is at odds with the free-market policies at the heart of the antitrust laws. *Nelson v. Pilkington PLC (In re Flat Glass Antitrust Litig.)*, 385 F.3d 350, 359–60 (3d Cir. 2004) (quoting PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW P 1429, at 207 (2d ed. 2000)) (cleaned up); *see also id.* at 60 ("[J]udicial remedies are incapable of addressing the anticompetitive effects of consciously parallel pricing"); *Clamp-All Corp. v. Cast Iron Soil Pipe Inst.*, 851 F.2d 478, 484 (1st Cir. 1988) (Breyer, J.) ("[I]t is close to impossible 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?").

Rather than "consciously parallel behavior," then, Section 1 has been interpreted to prohibit "concerted action." *Flat Glass*, 385 F.3d at 360 (citing *Jacob Blinder & Sons, Inc. v. Gerber Prods. Co.* (*In re Babyfood Antitrust Litig.*), 166 F.3d 112, 122 (3d Cir. 1999)).[10] Concerted action harms competition because it "deprives the marketplace of the independent centers of decisionmaking that competition assumes and demands." *Copperweld Corp. v. Indep. Tube Corp.*, 467 U.S. 752, 768 (1984)*; see also id.* at 769 ("In any conspiracy, two or more entities that previously pursued their own interests separately are combining to act as one for their common benefit. This not only reduces the diverse directions in which economic power is aimed but suddenly increases the economic power moving in one particular direction."). By ensuring "independent centers of decisionmaking," Section 1 enables courts to rely on basic market principles to ensure that prices and output stay responsive to consumer demand. *Id.* at 768.

[10] Not everyone agrees that this rule is warranted. Because interdependent oligopoly pricing is so harmful, several leading antitrust scholars, including Judge Richard Posner, have argued that conscious parallelism alone should be construed as a type of tacit agreement when it is accomplished by any voluntary act that can be enjoined in a practical way. *See, e.g., High Fructose Corn Syrup*, 295 F.3d at 654 (Posner, J.) ("If a firm raises price in the expectation that its competitors will do likewise, and they do, the firm's behavior can be conceptualized as the offer of a unilateral contract that the offerees accept by raising their prices."). For a concise summary of the academic debate, *see* ANDREW I. GAVIL, WILLIAM E. KOVACIC & JONATHAN B. BAKER, *Sidebar 3-2: The Turner/Posner debate on Conscious Parallelism, in* ANTITRUST LAW IN PERSPECTIVE: CASES, CONCEPTS AND PROBLEMS IN COMPETITION POLICY 302–05 (5th ed. 2024).

B. AI makes it easier for firms to coordinate decisionmaking through tacit agreement.

Even in an oligopoly, firms still have incentives to make actual agreements, whether tacit or express, to coordinate on price and output. That is because interdependent pricing is often unstable and difficult to achieve without an agreement. *See Blomkest*, 203 F.3d at 1042 ("While the oligopoly market structure naturally facilitates supra-competitive pricing, that same market structure also makes cooperative arrangements unstable . . . .") (dissenting opinion); *Brooke Group v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 227–28 (1993) ("Firms that seek to [raise prices] through the conscious parallelism of oligopoly must rely on uncertain and ambiguous signals to achieve concerted action. . . . This anticompetitive minuet is most difficult to compose and to perform, even for a disciplined oligopoly."). Without an agreement, each individual competitor is incentivized to secretly undercut the group's prices to earn extra profits. *See* George J. Stigler, *A Theory of Oligopoly*, 72 J. POL. ECON. 44, 46 (1964). And even with an agreement, the cartel usually can maintain itself only if cartel members have the ability to detect such "cheating" and punish it effectively. *Id.*; *Babyfood*, 166 F.3d at 137.

The difficulty of coordination thus gives rise to a collective action problem: firms cannot easily raise prices above competitive levels unless they enter a stable agreement, yet entering such an agreement creates the risk of detection and

prosecution by antitrust authorities. This collective action problem is a feature of the market system, not a bug. It makes it difficult for firms to earn extra profits by short-circuiting competition and harming consumers.

AI creates challenges for traditional methods of identifying collusion because it "solves" this collective action problem. Joshua P. Davis & Anupama K. Reddy, *AI and Interdependent Pricing: Combination Without Conspiracy?*, 30 J. ANTITRUST UCL & PRIV. SECTION CAL. LAWS. ASS'N 1, 3 (2020). AI can "remove the degree of strategic uncertainty in the marketplace and promote a stable market environment in which [firms] can predict each other's reaction and dominant strategy." Ezrachi & Stucke, *supra* n.5 at 1782. It can overcome firms' need to communicate directly and to police and punish cheating, making any agreement—but especially a tacit agreement—more stable and more effective.[11]

One way that AI makes tacit agreements more stable and effective is by standardizing inputs and outputs, eliminating the need for colluding firms to rely on "uncertain and ambiguous" signals about their behavior. *Brown & Williamson*

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[11] Cutting-edge economic research supports this finding. *See, e.g.*, Eshwar Ram Arunachaleswaran et al., *Algorithmic Collusion Without Threats* (revised Dec. 13, 2024) https://perma.cc/M9L3-RJ55 (using economic modeling to show how third-party algorithms can lead to stable supracompetitive pricing without a threat against cheating); Sophie Calder-Wang & Gi Heung Kim, Algorithmic Pricing in Multifamily Rentals: Efficiency Gains or Price Coordination? (Aug. 16, 2024), https://perma.cc/7QPM-Z3TX (using empirical methods to show that algorithmic pricing in U.S. multifamily rental market raises rents and reduces average occupancies).

Tobacco Corp., 509 U.S. at 227. Indeed, "the capacity to orchestrate such an agreement is the genius" of AI, as it allows parties to effectively coordinate their conduct without ever communicating with each other. *Meyer v. Kalanick*, 174 F. Supp. 3d 817, 825 (S.D.N.Y. 2016). For this reason, price-fixing schemes using AI are often achieved using a series of vertical agreements that are spread out in time and geography. *See id.* (inferring horizontal agreement to fix ride-share prices between "hundreds of thousands of independent transportation providers all across the United States" based on their joining and using the app between 2009 and 2016); *Yardi*, 2024 U.S. Dist. LEXIS 219629, at *4, *8–17 (inferring a tacit horizontal agreement between "geographically remote" multifamily housing lessors to fix residential lease prices based on their joining and using algorithmic platform between 2011 and 2024); *In re RealPage, Inc.*, 709 F. Supp. 3d at 494 (same, based on lessors' joining algorithmic platform between 2013 and 2022).

Another way that AI makes tacit agreements more stable and effective is by enabling complex decisionmaking based on large inputs of segregated data. Colluding firms can capitalize on the power of the data to generate anticompetitive effects and reap supracompetitive benefits without having to directly exchange the data with one another. Ohlhausen, *supra* n.6 at 10 (Firms can use AI to "maximize industry-wide pricing" even if they "don't directly share their pricing strategies" with each other.); Calder-Wang & Kim, *supra* n.11. For this reason, courts have

inferred a horizontal agreement where competitors use algorithms to benefit from each other's non-public data without sharing that data directly. *See Yardi*, 2024 U.S. Dist. LEXIS 219629, at *20 ("[T]he key to plaintiffs' antitrust claims is the horizontal agreements between and among the lessor defendants to entrust Yardi with their sensitive commercial information in order to obtain and implement the supracompetitive rental rates generated by Yardi's algorithm."); *RealPage*, 709 F. Supp. 3d at 510 (The "most persuasive evidence of horizontal agreement is the simple undisputed fact that each RMS Client Defendant 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.").

AI also has the ability to constantly update outputs based on real-time inputs. This means that cartel members using AI need not police each other's behavior to prevent cheating: because each cartel member's prices are automatically incorporated into the AI's outputs, no member can "secretly violate" the agreement. Stigler, *A Theory of Oligopoly*, 72 J. POL. ECON. at 46; *see also* Arunachaleswaran et al., *supra* n.11. Furthermore, each member is further incentivized to accept the algorithm's recommendations because they all understand that the pricing scheme only works if they do so. For this reason, courts have inferred a tacit price-fixing agreement when cartel members frequently adopt

the algorithm's recommendations, without requiring that they do so in all cases. *See Yardi*, 2024 U.S. Dist. LEXIS 219629, at *16 (inferring tacit agreement where "defendants intended to and, for the most part, did adhere to Yardi's pricing recommendations"); *In re RealPage*, 709 F. Supp. 3d at 519 (inferring tacit agreement notwithstanding that "RealPage's clients deviate or override [its] pricing recommendations" "as much as 10-20% of the time").

C. The "plus factor" analysis is flexible enough to adapt to the economic realities of AI.

Because collusion is illegal, it typically occurs in secret. Accordingly, plaintiffs usually rely on circumstantial evidence to prove that a challenged restraint stems from concerted action rather than independent decisions. When there is no direct or circumstantial evidence of an actual agreement, courts distinguish permissible parallel conduct from an impermissible tacit agreement by looking for certain "plus factors." *Flat Glass*, 385 F.3d at 360; *Bell Atl. Corp. v. Twombly*, 550 U.S. 544, 557 (2007).

"There is no finite set" or "exhaustive list" of plus factors. *Flat Glass*, 385 F.3d at 360. Rather, "[t]he plus-factor approach provides a loosely structured framework for making a circumstantial case." Christopher R. Leslie, *The Decline and Fall of Circumstantial Evidence in Antitrust Law*, 69 AM. U. L. REV. 1713, 1727 (2020) (Courts "have not coalesced on a uniform definition of plus factors."). And "because these are plus *factors*, not elements, no single plus factor is

dispositive or necessary to a plaintiff's case." *Id.* at 1728; GAVIL, KOVACIC & BAKER, *supra* n.10 at 304 ("[J]udges enjoy substantial discretion to define the elements of behavior that, when added to conscious parallelism, permit the fact finder to conclude that an agreement existed.").

Because AI did not previously exist, every previous case involving plus factors was premised on the hallmarks of human collusion. But the rise of machine learning and AI require that "legal assumptions geared to deal with human behavior need to be reexamined." Gal, *supra* note 6 at 229. Rather than making "formalistic distinctions," courts should flexibly examine "market impact" and "economic effect," with an eye to the overall "importance of consumer preference in setting price and output." *Am. Needle*, 560 U.S. at 191; *Monsanto*, 465 U.S. at 762; *NCAA*, 468 U.S. at 107. The focus should be on whether the alleged conduct tends to eliminate "independent centers of decisionmaking." *Copperweld*, 467 U.S. at 768; *see also Blomkest*, 203 F.3d at 1043 (dissenting opinion).

The district court's plus-factor analysis went wrong because it focused not functionally on the price and output effects of the alleged conspiracy, but formalistically on whether it showed the hallmarks of an express, human agreement. The district court failed to consider the competitive realities of AI, and it ignored the strongest plus-factor evidence alleged by Plaintiffs: that the Casino-

Hotel Defendants acted against their own economic interests by sacrificing room occupancy and providing non-public data to a common intermediary.

First, the court gave undue weight to its finding that the Casino-Hotel Defendants' agreements with Cendyn "occurred over a fourteen-year period," relying on this Court's opinion in *Burtch v. Milberg Factors* to hold that the timing "makes it quite implausible that they tacitly agreed to anything." A-9–10 (citing *Burtch v. Milberg Factors, Inc.*, 662 F.3d 212, 228 (3d Cir. 2011)).[12] But *Burtch* is an inapposite case involving an express agreement over the telephone. *Burtch*, 662 F.3d at 217–18. The allegations were that garment-industry defendants expressly agreed on whether and on what terms to extend credit to a garment seller during 27 telephone conversations occurring over a 20-month period. *Id.* at 217. This Court refused to infer an express unlawful agreement because the defendants "were choosing to decline, decrease, and even increase credit to [the seller] at different time periods" during the same 20 months. *Id.* at 228. *Burtch* does not set an upper limit on how far apart parallel conduct can be before an inference of an unlawful agreement can be supported; it stands for the unremarkable proposition that plus

[12] Plaintiffs allege that "every year each Casino-Hotel Defendant renews its license with Rainmaker, it reaffirms its commitment to the data-sharing agreement." Plaintiffs-Appellants' Br. 18–19, 39–40 (quoting *In re RealPage, Inc.*, 709 F. Supp. 3d 478, 404 (M.D. Tenn. 2023)) (cleaned up).

factors offered to establish an express agreement must be supported by plausible evidentiary allegations. *Id*.

Even if *Burtch* could be read to suggest a fixed, 20-month time limit for inferring express, human collusion, such a time limit makes little sense in the context of AI-coordinated price-setting. *See Kalanick*, 174 F. Supp. at 825; *Yardi Sys.*, 2024 U.S. Dist. LEXIS 219629, at *4, *8–17; *RealPage*, 709 F. Supp. 3d at 494. Like the algorithms at issue in *Kalanick*, *RealPage*, and *Yardi*, Cendyn's algorithm changes its price recommendations to earlier-joining users based on data provided by later-joining ones, and vice versa, effectively coordinating prices among customers who join the conspiracy years apart. *Compare* A-212 (¶ 6) ("[E]ach casino-hotel client provides its current, non-public room pricing and occupancy data to the Rainmaker platform on a continuous basis" and "[t]he algorithm ultimately uses this information to generate 'optimal' room rates, updated multiple times per day, for each client to charge guests."), *with* First Amended Complaint, *Meyer v. Kalanick*, 174 F. Supp. 3d 817 (S.D.N.Y. Jan. 29, 2016) at ¶ 47 ("As demand for car services increases among users, applying the Uber algorithm results in increased fares."). Considering how algorithmic pricing works, the fact that the Casino-Hotel Defendants contracted with Cendyn at different times sheds no light on the plausibility of Plaintiffs' allegations of concerted action via AI.

Second, the district court improperly focused its analysis on whether the Casino-Hotel Defendants directly shared information with each other. It incorporated the district courts' reasoning in *Gibson II* and *RealPage* to find that "Plaintiffs' 'failure to plausibly allege the exchange of confidential information from one of the spokes to the other through the hub's algorithms . . . compels the conclusion that there is no rim.'" A-13 (quoting *Gibson II*, 2024 U.S. Dist. LEXIS 83547, at *4); *see also* A-12 ("[I]t is unclear whether the pricing recommendations generated to Hotel Operators [in *Gibson v. MGM Resorts Int'l*, No. 2:23-cv-00140-MMD-DJA, 2023 U.S. Dist. LEXIS 190432 (D. Nev. Oct. 24, 2023) ("*Gibson I*")] include competitors' confidential information fed in; perhaps they only get their own confidential information back, mixed with public information from other sources.") (quoting *RealPage*, 709 F. Supp. at 512).[13]

Although the *RealPage* court distinguished *Gibson I* on the same basis, 709 F. Supp. 3d at 404, the district court in *Gibson II*—which was released three months after *RealPage*—acknowledged that plaintiffs' amended complaint clarified "their 'machine learning theory'—that the algorithms improved over time by running on confidential information provided by each Hotel Defendant."

[13] Plaintiffs repeatedly allege that Cendyn's algorithm makes recommendations to each of its customers based on the non-public information provided by the others. *See* Plaintiffs-Appellants Br. 21–22, 34–35.

Gibson II, 2024 WL 2060260 at *20; *see also id.* at *19 ("No Hotel Defendant gets direct access to the confidential information of another but gets the benefit of a system that has gotten better since it was launched in 2001 because it has run on the confidential data of many others in the past."). As the *RealPage* Court recognized, the "machine learning theory" is merely a recognition that rivals cannot lawfully use an AI-powered intermediary to facilitate reliance on each other's confidential information. *Realpage,* 709 F. Supp. 3d at 549 ("It is irrelevant . . . in what form the Defendants monitor their competitors' data—they still *use* that private data through their reliance on RealPage's pricing algorithm.").

What the district court and the court in *Gibson I* and *Gibson II* got wrong is that, considering the algorithm's ability "to maximize industry-wide pricing" even if "the firms themselves don't directly share their pricing strategies" with each other, the sharing of non-public data with the algorithm is itself indicative of a tacit price-fixing agreement. Ohlhausen, *supra* n.6 at 10; *see also Yardi*, 2024 U.S. Dist. LEXIS 219629, at *20; *RealPage*, 709 F.Supp.3d at 510. Here, the kind and degree of information the Casino-Hotel Defendants shared is particularly troubling: they gave Cendyn real-time access to their back-end vacancy and booking operations. A-211–12 (¶ 6). Absent an agreement to collude, it is against the self-interest of an individual firm to provide such data to a firm it knows will provide recommendations to its rivals. *Flat Glass*, 385 F.3d at 360–61 ("Evidence that the

defendant acted contrary to its interests means evidence of conduct that would be irrational assuming that the defendant operated in a competitive market.").

Third, the district court gave too much weight to the fact that the Casino-Hotel Defendants retained the ability to override Cendyn's price recommendations, holding that "the pricing authority the Casino-Hotels[] continued to retain and exercise[] makes it quite implausible that they tacitly agreed to anything, much less to fix the prices of their hotel rooms." A-10. But whether defendants retain the ability to set prices is relevant only to the extent it suggests the cartel cannot punish cheating when members of the conspiracy secretly undercut the group's prices. *Babyfood*, 166 F.3d at 122. Because the algorithm's ability to incorporate real-time pricing data into each of its recommendations obviates the need to police members, courts in algorithmic price-fixing cases have inferred an agreement even in the absence of "an absolute delegation" of price-setting authority. *In re RealPage*, 709 F. Supp. 3d at 519; *see also Yardi*, 2024 U.S. Dist. LEXIS 219629, at *16. In this case, as in *Yardi*, "Plaintiffs allege that [Cendyn] advertised its services as automating the [hotels'] pricing decisions, that the [Casino-Hotel] defendants understood that implementing the system was critical to the success of the enterprise and therefore generally adopted [Cendyn's] pricing recommendations, that defendants engaged in conduct to facilitate and enforce the implementation of the pricing recommendations, and that [Cendyn] was, in fact, able to generate

above-market prices using a system that required adoption of its recommendations for success." *Id.* at *16–17; *see* Plaintiffs-Appellants' Br. at 16–17, 19. These non-conclusory allegations establish that each Casino-Hotel Defendant accepted the algorithm's prices often enough to serve the common purpose of raising prices market-wide, and should give rise to an inference of agreement.

Finally, the district court ignored perhaps the strongest indicator of the Casino-Hotels' tacit agreement to collude: the fact that they left hotel rooms unoccupied, reducing output. Plaintiffs-Appellants' Br. at 57. When the evidence shows only price increases in a concentrated market, this could tend to suggest that some firms are colluding but not others, since firms that are not part of the conspiracy would have an incentive to use the elevated cartel price as an umbrella under which to raise their own price opportunistically. PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW § 1408e (4th ed. 2024) [hereinafter "ANTITRUST LAW"]. But firms that are not part of a conspiracy never have an incentive to reduce their own output. Even in concentrated markets, decreasing output is unambiguously against a firm's independent self-interest because it gives away business to the remaining competitors. *Id.* at § 1408e n.21 ("The output reduction is suspicious because normally the nonmember competitor of the cartel would wish to enlarge its output, given the high profits on each sale."). To rent fewer hotel rooms without trusting that your competitors will do the same is to

sacrifice profits pointlessly—something rational businesses do not do. Firms' parallel output reduction is thus a strong indicator of an agreement to collude. *See Flat Glass*, 385 F.3d at 360–61; ANTITRUST LAW, § 1408e (A firm's "output reduction serves to make the cartel more stable and long-lived, means that [its] behavior is against its independent self-interest, and makes that behavior indistinguishable from that of other cartel members.").

II. A Series of Vertical Agreements Can Be Anticompetitive.

Courts have long recognized that vertical agreements can have collusive effects that harm competition, even in the absence of horizontal collusion. *See, e.g.*, *Leegin*, 551 U.S. at 882 (holding that "vertical price restraints are to be judged by the rule of reason"); *In re Musical Instruments & Equip. Antitrust Litig.*, 798 F.3d 1186, 1192, n.3 (9th Cir. 2015) ("[A] rimless hub-and-spoke conspiracy is not a hub-and-spoke conspiracy at all (for what is a wheel without a rim?); it is a collection of purely vertical agreements. But such a conspiracy may yet unreasonably restrain trade."). Indeed, vertical restraints (such as resale price maintenance) are potentially anticompetitive primarily because of these collusive effects. *See, e.g.,* Gavil et al., *supra* n.10 at 911 ("[V]ertical intrabrand agreements . . . can be used by a group of competing dealers or manufacturers to help facilitate price coordination—*collusive* effects."); *Toledo*, 530 F.3d at 216 n.8 ("[W]hen all manufacturers in the market enter into agreements with their dealers to keep prices

artificially high . . . such collusive agreements may be unlawful under the rule of reason analysis applied to vertical price restraints under § 1."). Thus, in determining whether an alleged restraint is anticompetitive, courts should center their analysis not formally on whether it is horizontal or vertical in orientation but functionally on the nature of its competitive effects. Gavil, et al., *supra* n.10 at 48 (Categories of anticompetitive conduct are "defined by the nature of the effects they can precipitate: *collusive* or *exclusionary*. The distinction flows not so much from the relationship between the parties . . . , but from the *mechanism for producing anticompetitive effects*.").

The district court erred when it failed to consider whether the Casino-Hotel Defendants' agreements with Cendyn were anticompetitive by themselves, relying on this Court's opinion in *Insurance Brokerage* to sweep away the possibility. A-13. ("Without . . . context [suggesting a horizontal agreement,] the Casino-Hotels' use of the same pricing software evinces 'nothing more than a series of vertical relationships.'") (quoting *Ins. Brokerage*, 618 F.3d at 327). But *Insurance Brokerage* does not stand for the proposition that a series of vertical relationships cannot have collusive anticompetitive effects. Plaintiffs in that case specified that they did *not* seek to prove "rimless" hub-and-spoke conspiracies, and that their theory of liability depended on a horizontal "rim" agreement. 618 F.3d at 318–19 ("Plaintiffs abjure a full-scale rule of reason analysis," which, because "virtually

all vertical agreements . . . receive a traditional rule-of-reason analysis," they conceded meant showing "the existence of a horizontal agreement."). Thus, this Court dismissed allegations of only those conspiracies for which it could not infer a horizontal agreement. *See id.* at 326–48; *id.* at 362 ("Given plaintiffs' exclusive reliance on a per se or quick look analysis, the absence of a horizontal agreement is fatal to their § 1 claims.").

Here, Plaintiffs allege that the vertical agreements between the Casino-Hotels and Cendyn had actual detrimental effects in the form of reduced hotel occupancy and higher room prices, the "hallmarks of anticompetitive behavior." *NCAA*, 468 U.S. at 113; Plaintiffs-Appellants Br. 56–57. Together with their allegations of market power, that is sufficient to plead a plausible rule of reason claim.

CONCLUSION

For the foregoing reasons, the district court's opinion should be reversed.

Respectfully submitted,

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COMBINED CERTIFICATIONS

I, David O. Fisher, hereby certify that:

1. I am a member of the bar of this Court.

2. This brief complies with the type-volume limitation of Fed. R. App. P. 32(a)(7)(B) because it contains 6,311 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(f).

3. This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5)(A) and the type styles requirements of Fed. R. App. P. 32(a)(6) because the brief has been prepared in a proportionally spaced typeface using Microsoft Word, in 14 point Times New Roman font.

4. Pursuant to Third Circuit Local Appellate Rule 31.1(c), the PDF file and the text of the paper version of the brief are identical. The electronic version of the brief has been scanned for viruses by OPSWAT MetaDefender Cloud (current version) and no viruses were found.

5. On January 28, 2025, I electronically filed the foregoing brief with the Clerk of the Court for the United States Court of Appeals for the Third Circuit using the appellate CM/ECF system. Counsel for all parties to the case are registered CM/ECF users and service will be accomplished by the appellate CM/ECF system.

Dated: January 28, 2025

/s/ David O. Fisher
DAVID O. FISHER