## NOT FROM CONCENTRATE: COLLUSION IN COLLABORATIVE INDUSTRIES

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#### ABSTRACT

It is a core principle of antitrust law and theory that reduced market concentration lowers the risk of anticompetitive behavior. We demonstrate that this principle is fundamentally incomplete.

Traditional models assume that firms interact only as competitors. We examine and model "Collaborative Industries," which afford rival firms opportunities to meaningfully collaborate. For example, in some industries, firms compete to win business, but then work together to complete production (e.g., through subcontracting). Firms in Collaborative Industries have powerful ways to reward or

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punish each other beyond raising or lowering the prices they offer to customers. These mechanisms create much greater scope for collusion than economic models conventionally recognize.

We show that Collaborative Industries can sustain anticompetitive collusive behavior no matter how unconcentrated the industry becomes. In some instances, lower market concentration makes collusion easier; smaller firms may be more dependent on collaboration with rivals and thus may be easier to punish if they undercut collusion. These results run directly counter to the conventional wisdom, gleaned from models of non-Collaborative Industries, that permeates antitrust law.

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#### I. INTRODUCTION

A longstanding, fundamental principle of antitrust law is that concentrated markets are more likely to exhibit anticompetitive behavior.<sup>5</sup> Conversely, less concentrated markets are less likely to exhibit anticompetitive behavior. The logic of this "Concentration Principle" is straightforward: When an industry is comprised of many small firms, it is more difficult for them to collude on a high price, and more likely that a firm will "cheat," undercutting the collusive price in order to attract more customers.<sup>6</sup>

The Concentration Principle is unquestioned and ubiquitous in antitrust law and theory. It is literally textbook antitrust economics.<sup>7</sup> A large body of academic literature, both theoretical and empirical, takes it as a given.<sup>8</sup> Courts have repeatedly invoked

<sup>&</sup>lt;sup>5</sup> See, e.g., Matsushita v. Zenith Radio Corp., 475 U.S. 574 (1986); Tops Markets Inc. v. Quality Markets, Inc. 142 F.3d 90, 99 (2d Cir. 1998) (quoting PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW (1996)); Oahu Gas Serv., Inc. v. Pacific Resources Inc., 838 F.2d 360, 365-67 (9th Cir. 1988); U.S. DEP'T OF JUSTICE, HORIZONTAL MERGER GUIDELINES, Aug. 19, 2010 at 15 § 5 [hereinafter HMG]; ANDREW I. GAVIL ET AL., ANTITRUST LAW IN PERSPECTIVE: CASES, CONCEPTS, AND PROBLEMS IN COMPETITION POLICY 39 (2002); ANDREU MAS-COLLEL ET AL., MICROECONOMIC THEORY 383 (1995); RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 372 (8th ed. 2011); George J. Stigler, *A Theory of Oligopoly*, 72 J. POL. ECON. 44 (1964).

<sup>&</sup>lt;sup>6</sup> See, e.g., Stigler, supra note 5; cf. Jordan M. Barry et al., Coasean Keep-Away: Voluntary Transaction Costs, available at https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=2403839 (describing an individual firm's incentives to resist contributing to a common enterprise if its non-participation does not doom the enterprise). Similarly, it becomes harder to police the cartel, as there are more potential sources of cheating and the lure of increased market share is often more attractive for a smaller firm than a larger one. See, e.g., HMG, supra note 5, at 15 § 5 ("For example, if a price reduction to gain new customers would also apply to a firm's existing customers, a firm with a large market share may be more reluctant to implement a price reduction than one with a small share."); POSNER, supra note 5, at 372.

<sup>&</sup>lt;sup>7</sup> See, e.g., GAVIL ET AL., *supra* note 5, at 39 ("Antitrust law primarily is concerned with two of the features associated with perfect competition: the numbers of buyers and sellers, and conditions of entry."); DOUGLAS F. GREER, INDUSTRIAL ORGANIZATION AND PUBLIC POLICY (3d ed. 1992); POSNER, *supra* note 5, at 372; DON E. WALDMAN & ELIZABETH J. JENSEN, INDUSTRIAL ORGANIZATION: THEORY AND PRACTICE (2d ed. 2001).

<sup>&</sup>lt;sup>8</sup> See, e.g., Peter C. Carstensen, Concentration and the Destruction of Competition in Agricultural Markets: The Case for Change in Public Policy, 2000 WISC. L. REV. 531; John M. Connor, Empirical Challenges in Analyzing Market Performance in the U.S. Food System, 1990 AM. J. AGR. ECON. 1220; Ronald W. Cotterill, Food Mergers: Implications for Performance and Policy, 1990 REV. INDUS. ORG. 196; Dennis C. Mueller, Further Comment on the Social Benefits from an Effective Antimerger Policy, 1997 REV. INDUS. ORG. 698; Richard

it,<sup>9</sup> and the Department of Justice ("DOJ") and the Federal Trade Commission ("FTC") explicitly incorporate it into their regulations and decision-making processes.<sup>10</sup>

Yet the Concentration Principle is fundamentally incomplete. The economic models underlying the Concentration Principle assume that rival firms only interact through competition. Firms can compete with rivals more or less aggressively, but that is their only interaction. For example, if the firms in an industry all agree to charge high prices—i.e., not to compete with each other and a firm breaks that agreement, the only way for the rest of the industry to punish that firm is to slash their own prices in response i.e., to compete aggressively.

However, in many industries—including finance, law, sports, construction, manufacturing, art, transportation, real estate, energy, and telecommunications—rival firms also engage in mutually beneficial interactions. In these "Collaborative Industries," firms cooperate as well as compete. For example, consider residential realtors. They compete with each other for listings, but they also collaborate: A seller's agent wants other realtors to tell potential buyers about the seller's property, and vice versa. When a buyer's offer is accepted, realtors work together to manage the sales process and make sure the transaction is completed.

Firms in Collaborative Industries have greater ability to punish and reward each other than firms that only interact as competitors. Firms in Collaborative Industries thus have more mechanisms to enforce collusion than conventional antitrust thinking contemplates. In particular, firms in a Collaborative Industry can refuse to transact with any rival that cuts its prices below the collusive price. The threat of such ostracism can deter firms from cutting prices in the first place. Further, the cost of being ostracized does not necessarily decline as an industry becomes less concentrated. Isolation can hurt smaller firms more than large ones. In such cases, lower market concentration can *encourage* collusive behavior. For example, if a realtor's peers steer their clients toward

Schmalensee, *Inter-Industry Studies of Structure and Performance*, in 1 HANDBOOK OF INDUSTRIAL ORGANIZATION (Richard Schmalensee & Robert D. Willig eds. 1989).

<sup>&</sup>lt;sup>9</sup> See, e.g., Matsushita, 475 U.S. 574; Tops Markets, 142 F.3d 90; Oahu Gas Serv., 838 F.2d 360.

<sup>&</sup>lt;sup>10</sup> For example, when market concentration is low enough, mergers are generally exempt from antitrust review by the Department of Justice. HMG, *supra* note 5, at 19 § 5.3. In contrast, when market concentration is above a specified level, horizontal mergers are presumed to have unacceptable anticompetitive effects. *Id.* 

her listings, she will benefit. Conversely, if her fellow realtors ostracize her, she will suffer.<sup>11</sup> In a market with many small realtors, a realtor shunned by her peers will have a hard time attracting and keeping clients.

Collaborative Industries have often exhibited behaviors that are difficult to reconcile with the Concentration Principle. For example, U.S. realtors have been charging 6% commissions on residential home sales for decades. Over that period, the Internet has made it much easier for home buyers and sellers to find each other, yet realtors' market share and pricing have largely remained unchanged. The uniformity in pricing and resistance to change, despite this technological shock, suggests collusive pricing—as a major pending lawsuit alleges.<sup>12</sup> At the same time, the industry features low levels of concentration and low barriers to entry.<sup>13</sup> Conventional economic theory offers little to explain how collusion could persist under such conditions.<sup>14</sup>

Similarly, consider the U.S. market for underwriting initial public offerings ("IPOs") of corporate equity (the "IPO Underwriting Market"). The IPO Underwriting Market is an example of a type of Collaborative Industry which we deem a

<sup>&</sup>lt;sup>11</sup> See Competitive Impact Statement, United States v. Nat'l Assoc. of Realtors, Case No. 1:20-cv-03356-TJK (D.D.C. Dec. 10, 2020) (challenging NAR rules that allowed buyer brokers to filter, and hide from buyers, listings that offer agents lower commissions) [hereinafter 2020 Realtor Statement].

<sup>&</sup>lt;sup>12</sup> See Moehrl v. Nat'l Assoc. of Realtors, Case 1:19-cv-01610, Mar. 6, 2019 (N.D. Ill.), https://www.courthousenews.com/wp-content/uploads/2019/03/119cv1610-USDC-Northern-Illinois.pdf; see also Competitive Impact Statement, United States v. Nat'l Assoc. of Realtors, No. 05 C 5140, June 12, 2008 (N.D. Ill.) [hereinafter DOJ Realtor Statement] (describing terms of settlement of 2005-2008 DOJ lawsuit against realtors, alleging collusion against realtors offering extensive Internet-based services, in which DOJ obtained substantially all requested concessions).

<sup>&</sup>lt;sup>13</sup> See, e.g., Jason Beck et al., Concentration and Market Structure in Local Real Estate Markets, 40 REAL ESTATE ECON. 422 (2012); U.S. FED'L TRADE COMM'N & U.S. DEP'T OF JUSTICE, COMPETITION IN THE REAL ESTATE BROKERAGE INDUSTRY (2007), available at https://www.ftc.gov/sites/default/files/documents/reports/competition-realestate-brokerage-industry-report-federal-trade-commission-and-u.s.department-

estate-brokerage-industry-report-federal-trade-commission-and-u.s.departmentjustice/v050015.pdf. <sup>14</sup> See, e.g., Chang-Tai Hsieh & Enrico Moretti, *Can Free Entry Be Inefficient?* 

Fixed Commissions and Social Waste in the Real Estate Industry, 111 J. POL. ECON. 1076 (2003) ("[T]he apparent uniformity of commission rates presents an enormous puzzle."); see also B. Douglas Bernheim & Jonathan Meer, Do Real Estate Brokers Add Value When Listing Services Are Unbundled?, 51 ECON. INQUIRY 1166 (2013) (arguing that real estate agents provide poor service at high prices despite low barriers to entry); Steven D. Levitt & Chad Syverson, Market Distortions When Agents Are Better Informed: The Value of Information in Real Estate Transactions, 90 REV. ECON. & STATISTICS 599 (2008) (similar).

"Syndicated Market": Underwriters compete with each other to win underwriting business from companies that are going public. But once a company chooses its lead underwriter, that underwriter puts together a "syndicate" of underwriters to execute the IPO—in other words, the lead underwriter subcontracts some of the work to its erstwhile rivals.<sup>15</sup>

For decades, DOJ and FTC guidelines have consistently characterized the IPO Underwriting Market as "unconcentrated."<sup>16</sup> Yet U.S. underwriters' fees for small and mid-size IPOs are extremely tightly clustered.<sup>17</sup> A recent SEC study found that, from 2001 to 2016, "over 96% of midsized IPOs featured a [fee] of exactly 7%" of the value of stock sold.<sup>18</sup> Non-U.S. underwriters charge significantly lower and less uniform fees.<sup>19</sup> Commentators have divided over whether the IPO Underwriting Market is collusive. Proponents point to the industry's strange pricing behavior,<sup>20</sup> while opponents point to the market's lack of concentration.<sup>21</sup> For their part, issuers have taken a negative view of the IPO Underwriting Market, and have increasingly avoided conducting traditional IPOs in recent years.<sup>22</sup>

Our analysis explains how the IPO Underwriting Market could produce collusive outcomes despite being unconcentrated.

<sup>&</sup>lt;sup>15</sup> See note 116, infra.

<sup>&</sup>lt;sup>16</sup> Robert S. Hansen, *Do Investment Banks Compete in IPOs? The Advent of the* "7% *Plus Contract*", 59 J. FIN. ECON. 313 (2001); Ari Kang & Richard Lowery, *The Pricing of IPO Services and Issues: Theory and Estimation*, 2 REV. CORP. FIN. STUD. 188 (2014).

<sup>&</sup>lt;sup>17</sup> See Husan-Chi Chen & Jay R. Ritter, *The Seven Percent Solution*, 55 J. FIN. 1105 (2000).

<sup>&</sup>lt;sup>18</sup> Securities and Exchange Commissioner Robert J. Jackson Jr., Speech at the Greater Cleveland Middle Market Forum (Apr. 25, 2018), *available at* https://www.sec.gov/news/speech/jackson-middle-market-ipo-tax.

<sup>&</sup>lt;sup>19</sup> See, e.g., Sami Torstila, *The Clustering of IPO Gross Spreads: International Evidence*, 38 J. FIN & QUANT. ANAL. 673 (2003).

<sup>&</sup>lt;sup>20</sup> See, e.g., Mark Abrahamson et al., *Why Don't U.S. Issuers Demand European Fees for IPOs?*, 66 J. FIN. 2055 (2011); Chen & Ritter, *supra* note 17; Kang & Lowery, *supra* note 16; Evgeny Lyandres et al., *Do Underwriters Compete in IPO Pricing?*, 64 MGMT SCI. 925 (2018).

<sup>&</sup>lt;sup>21</sup> See, e.g., Hansen, *supra* note 16; Torstila, *supra* note 19.

<sup>&</sup>lt;sup>22</sup> See, e.g., Matt Levine, Money Stuff, BLOOMBERG, July 27, 2020, https://www.bloomberg.com/opinion/articles/2020-07-27/spacs-aren-t-cheaper-than-ipos-yet https://www.bloomberg.com/opinion/articles/2020-07-27/spacs-aren-t-cheaper-than-ipos-yet ("People complain about . . . IPO fees and IPO pops[] constantly; venture capitalists are always going around saying that the IPO process is broken and that something needs to replace it. Last year that something was direct listings; this year SPACs are getting all the attention."); Yun Li, SPACs Outpace Traditional IPOs 2 Months Straight, CNBC, Sept. 9, 2020, https://www.cnbc.com/2020/09/09/spacs-outpace-traditional-ipos-2-months-straight-bringing-2020-issuance-to-a-record-33-billion.html.

The syndication process is a collaborative interaction that can be used to support collusion, even when industry concentration is  $low.^{23}$ 

Collaborative Industries have considerable economic, political, and cultural significance. Again, consider the IPO Underwriting Market. It is a large market—U.S. companies raised over \$65 billion through IPOs in 2019 alone<sup>24</sup>—but IPOs' importance extends beyond this measure. Going public is a major milestone in a company's lifecycle; it raises the company's profile, make the company more transparent, makes future fundraising easier, and gives ordinary people their first chance to invest in the company.<sup>25</sup> Scholars have argued that, because public companies face greater scrutiny, they are also more accountable to stakeholders and society at large.

The number of U.S. IPOs has declined precipitously since 2000.<sup>26</sup> Many count the decrease in IPOs among this generation's most significant developments in U.S. capital markets.<sup>27</sup> Some have

<sup>&</sup>lt;sup>23</sup> IPO Underwriters can use the same approaches we discuss here to collusively extract value from issuers in other ways, such as systematically mis-pricing IPOs. *See, e.g.*, Patrick M. Corrigan, *The Seller's Curse and the Underwriter's Pricing Pivot: A Behavioral Theory of IPO Pricing*, 13 VA. L. &. BUS. REV. (2019); *Silicon Valley Investors Call a Summit to Rethink the IPO Business*; BLOOMBERG, Sept. 30, 2019, https://www.latimes.com/business/story/2019-09-30/silicon-valley-investors-call-summit-to-disrupt-ipo-business.

<sup>&</sup>lt;sup>24</sup> Sara B. Potter, U.S. IPOs Raised More Money in 2019, Despite a Decline in IPO Volume, FACTSET.COM, Jan. 9, 2020, https://insight.factset.com/u.s.-ipos-raised-more-money-in-2019-despite-a-decline-in-ipo-volume.

<sup>&</sup>lt;sup>25</sup> See, e.g., Elisabeth de Fontenay, *The Deregulation of Private Capital and the Decline of the Public Company*, 68 HASTINGS L.J. 445 (2017); Frank Partnoy, *The Death of the IPO*, ATLANTIC, Nov. 2018, https://www.theatlantic.com/magazine/archive/2018/11/private-inequity/570808/.

<sup>&</sup>lt;sup>26</sup> Professor John J. Coffee, Testimony before the House Financial Services Committee's Subcommittee on Capital Markets, Securities, and Investments, May 29, 2018 ("In 1980-2000, an average of 310 firms went public every year" but "In 2001-2016, an average of 108 firms went public every year").

<sup>&</sup>lt;sup>27</sup> For example, numerous SEC Commissioners have given speeches devoted to the topic. In 2017, in his first major speech as SEC Chairman, Jay Clayton stated:

<sup>[</sup>T]he reduction in the number of U.S.-listed public companies is a serious issue for our markets and the country more generally. To the extent companies are eschewing our public markets, the vast majority of Main Street investors will be unable to participate in their growth. The potential lasting effects of such an outcome to the economy and society are, in two words, not good.

SEC Chairman Jay Clayton, Remarks at the Economic Club of New York, July 12, 2017, https://www.sec.gov/news/speech/remarks-economic-club-new-york; *see also* Jackson, *supra* note 18; SEC Commissioner Hester M. Peirce, Tossing Fish and Catching Capital: Remarks at the 38th Annual Northwest Securities

argued that the decline in IPOs has made industries less competitive and products more expensive.<sup>28</sup> SEC Commissioner Robert Jackson Jr. recently argued that the size of underwriting fees—by far the largest direct cost of going public<sup>29</sup>—is a major contributor to the IPO decline.<sup>30</sup> If Commissioner Jackson is correct, understanding the dynamics of Collaborative Industries is an essential prerequisite to addressing the IPO decline.<sup>31</sup>

In this Article, we present a game-theoretic model that gives new insight into Collaborative Industries, and thus antitrust law. Our analysis reconciles collusion with low market concentration. More fundamentally, our analysis suggests that firms in Collaborative Industries will have greater ability to collude, and that we will therefore see more collusion in these industries, than existing theory suggests. This insight yields four chief legal and policy implications.

Jackson, supra note 18.

Institute CLE at the Washington State Bar Association, Seattle Washington, May 4, 2018, https://www.sec.gov/news/speech/speech-peirce-050418.

<sup>&</sup>lt;sup>28</sup> See, e.g., Bruno Pellegrino, Product Differentiation, Oligopoly, and Resource Allocation, WRDS Research Paper, *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=3329688; see also Hung-Chia Hsu et al., *The New Game in Town: Competitive Effects of IPOs*, 65 J. FIN. 495 (2010).

<sup>&</sup>lt;sup>29</sup> Underwriters' fees comprise approximately 75% of firms' out-of-pocket IPO costs. John J. Coffee, Jr., *The Irrepressible Myth That SEC Overregulation Has Chilled IPOs*, CLS BLUE SKY BLOG, May 29, 2018, https://clsbluesky.law.columbia.edu/2018/05/29/the-irrepressible-myth-that-sec-overregulation-has-chilled-ipos/.

<sup>30</sup> 

You see, when I was a banker [twenty years ago], we charged a standard fee for a middle-market IPO: seven percent. . . . [O]ur fee was always seven percent. Whatever industry the company was in, whatever its growth profile, however qualified its management team was, if they were a smaller firm, they always paid seven percent.

<sup>...</sup> I assumed that technology and competition would eventually lead bankers to give middle-market companies better pricing .... [But] nothing has changed: middle-market entrepreneurs still have to pay 7%

<sup>...</sup> I think it's high time to ask whether middle-market companies are paying too high a price for access to America's capital markets.

<sup>. . .</sup> With the deck stacked against them, it's no wonder that middlemarket IPOs have been on a steady decline. And this has had real effects across our economy . . . .

<sup>&</sup>lt;sup>31</sup> We make no causal claims about pricing in the IPO Market or any other specific market. This paper is theoretical, not empirical. And while we do present some suggestive evidence supporting the dynamics we identify, we do not present the kind of in-depth analysis necessary to determine the extent to which those dynamics have raised prices and reduced output in specific contexts. We leave that important project for future scholarship.

First, our analysis has direct impacts for multiple antitrust doctrines. For example, in many instances, collusive behavior only violates antitrust laws when it is conducted pursuant to an agreement; industry-wide supra-competitive pricing without an agreement is generally legal.<sup>32</sup> However, fact-finders can infer an agreement from circumstantial evidence, sometimes referred to as "plus factors." Our analysis identifies certain suspect industry behaviors that accompany and facilitate collusion, in particular, (1) refusing to transact with firms that cut prices; and (2) rewarding firms that refuse to transact with firms that cut prices. Courts and agencies should count both behaviors as plus factors supporting the existence of an agreement.

Second, our results inform how regulators and other plaintiffs should select and present cases. Industries in which firms have many interconnections merit additional scrutiny. The DOJ and FTC have observed this phenomenon through their experience and have incorporated it into their formal guidance to some extent.<sup>33</sup> Our results support the agencies' observation and, for the first time, provide a rigorous theoretical underpinning for it. Similarly, agencies have explicitly incorporated the Concentration Principle into their case selection process.<sup>34</sup> In certain contexts, agencies assume that, if industry concentration is low enough, there cannot be collusion.<sup>35</sup> Our results belie this assumption and favor a more contextualized evaluation.

Third, our results should inform the public guidance that antitrust agencies issue. These documents are intended to help businesses comply with the antitrust laws and to help potential victims of collusive behavior identify and report it.<sup>36</sup> For instance,

<sup>&</sup>lt;sup>32</sup> See, e.g., Brooke Group 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").

<sup>&</sup>lt;sup>33</sup> U.S. DEP'T OF JUSTICE, PRICE FIXING, BID RIGGING, AND MARKET ALLOCATION SCHEMES: WHAT THEY ARE AND WHAT TO LOOK FOR 5 (2015) [hereinafter DOJ, IDENTIFYING VIOLATIONS].

<sup>&</sup>lt;sup>34</sup> See, e.g., HMG, supra note 5; FED'L TRADE COMM'N & U.S. DEP'T OF JUSTICE, ANTITRUST GUIDELINES FOR COLLABORATIONS AMONG COMPETITORS (2000), available at

https://www.ftc.gov/sites/default/files/documents/public\_events/joint-venturehearings-antitrust-guidelines-collaboration-among-competitors/ftcdojguidelines-2.pdf [hereinafter COLLABORATION GUIDELINES]

<sup>&</sup>lt;sup>35</sup> HMG, *supra* note 5; COLLABORATION GUIDELINES, *supra* note 34, at 26.

<sup>&</sup>lt;sup>36</sup> To some extent, this category overlaps with agencies' internal analyses described in the previous paragraph. For example, the horizontal merger

the DOJ issues guidance intended to help market participants detect and respond to "Price Fixing, Bid Rigging, and Market Allocation Schemes."<sup>37</sup> This document identifies conditions that make an industry more susceptible to collusion;<sup>38</sup> high market concentration is the first condition listed.<sup>39</sup> However, the list of conditions does not include the degree of collaborative interactions within an industry.<sup>40</sup> These and other documents should be updated to reflect the increased scope for collusion that we identify in Collaborative Industries.

Fourth, our analysis suggests two tools that may be effective against collusion in Collaborative Industries: altering market structure and increasing firms' capacity. Market structure exerts powerful effects on the likelihood that firms will collude and the ways in which they will do so. Further, many Collaborative Industries are heavily regulated; the overarching legal regimes that govern these industries strongly influence their organizational structures. For example, U.S. securities laws effectively require a firm that wishes to conduct an IPO to retain an underwriter, which strengthens any potential underwriting cartel.<sup>41</sup> Changing the law to make underwriters less central to IPOs would weaken underwriters' position, thereby discouraging collusive behavior.<sup>42</sup>

Similarly, firms with greater productive capacity are often less dependent on their rivals. Because interdependence among firms can foster collusion, increasing firms' capacity can undermine collusion. For example, in Syndicated Markets, firms with greater capacity may face higher potential rewards from cheating on a cartel and may also be less susceptible to punishment by other firms. In the context of IPO underwriters, greater capacity means having access to a larger pool of potential IPO investors. Changing the laws and regulations governing IPOs to broaden the pool of IPO investors

guidelines help private actors to anticipate how regulators will respond to different potential transactions, and thus plan accordingly.

<sup>&</sup>lt;sup>37</sup> DOJ, IDENTIFYING VIOLATIONS, *supra* note 34.

<sup>&</sup>lt;sup>38</sup> Id. passim.

<sup>&</sup>lt;sup>39</sup> Id.

 $<sup>^{40}</sup>$  *Id.* at 5. The document does identify personal connections among competitors as such a condition, *id.* and horizontal subcontracting as a potentially problematic behavior, *id.* at 3-4.

<sup>&</sup>lt;sup>41</sup> A regulation that encourages issuers to use underwriters raises issuers' reservation price for underwriting services, which enables an underwriter cartel to potentially charge higher prices. *See* Part VI.E.1, *infra*.

<sup>&</sup>lt;sup>42</sup> There are countervailing reasons why one might not wish to make this change. Our analysis simply adds one more factor to the policy decision.

could potentially impede collusion in the IPO Underwriting Market.<sup>43</sup>

This Article proceeds as follows. Part II provides a brief primer on U.S. antitrust law and theory. Part III gives background on Collaborative Industries, with special focus on two specific types of Collaborative Industries: (1) Syndicated Markets, such as the IPO Underwriting Market, and (2) Brokered Markets, such as the market for residential realtors. Part IV presents an overarching model of Collaborative Industries and the implications of that model. It grounds this overarching model in models of Syndicated and Brokered Markets.<sup>44</sup> Part V considers the Collaborative Industries Model's application to real-world environments. Part VI discusses policy implications of our analyses and Part VII concludes.

#### II. A BRIEF ANTITRUST PRIMER

We begin with some brief antitrust background. We first provide a brief overview of the high points of U.S. antitrust law.<sup>45</sup> This overview also highlights the prominent role that the Concentration Principle plays in antitrust law. We then turn to antitrust economic theory, the intellectual underpinning of modern antitrust law.<sup>46</sup>

<sup>&</sup>lt;sup>43</sup> There are countervailing concerns. We merely highlight one new argument pushing in favor of moving in this direction.

<sup>&</sup>lt;sup>44</sup> These models were first and formally presented in two companion papers. All four co-authors of this Article are co-authors of John William Hatfield et al., *Collusion in Markets with Syndication*, 128 J. POL. ECON. 3779 (2020) [hereinafter *Syndicated Markets*]; Hatfield, Kominers, and Lowery are co-authors of John William Hatfield et al., Collusion in Brokered Markets [hereinafter Brokered Markets]. As the co-authors of these companion papers are subsets of the co-authors of this Article, for ease of exposition, we use the terms "we" and "our" when referring to these two companion papers and their contents at various points throughout this Article. For the avoidance of doubt, we note that not all co-authors of this Article are co-authors of both companion pieces.

<sup>&</sup>lt;sup>45</sup> While we generally do not discuss non-U.S. antitrust law, we note that the issues discussed in Subpart A are also present in many other countries' bodies of law.

<sup>&</sup>lt;sup>46</sup> See, e.g., Merrick B. Garland, Antitrust and State Action: Economic Efficiency and the Political Process, 96 YALE L.J. 486, 486 (1987) ("The analysis of legal doctrine in terms of its contribution to economic efficiency originated in antitrust law."); David W. Barnes, Nonefficiency Goals in the Antitrust Law of Mergers, 30 WM. & MARY L. REV. 787, 790 (1989) ("Antitrust scrutiny of [mergers and acquisitions] relies heavily, if not exclusively, on economics.")

## A. Antitrust Law

The landmark Sherman Antitrust Act of 1890 (the "Sherman Act") forms the wellspring of U.S. antitrust law.<sup>47</sup> Section 1 of the Sherman Act forbids any "contract, combination . . . or conspiracy, in restraint of trade."<sup>48</sup> This broad and sweeping language prohibits a wide variety of anticompetitive conduct. At the same time, there are a number of important limitations that reduce the scope of what is prohibited. Two are of particular importance to our analysis here.

First, although the language of Section 1 outlaws "restraint of trade," courts have long applied different standards to different forms of trade-restraining conduct.<sup>49</sup> Courts have found that Section 1 straightforwardly prohibits some behaviors, such as price fixing, quantity fixing, and dividing territory among competitors. These activities are sometimes referred to as "per se" violations.<sup>50</sup> Other behaviors are not automatically prohibited, and must be analyzed under the more contextualized "rule of reason" to determine whether they have anticompetitive effects.<sup>51</sup> The rule of reason has a long history, but has become increasingly important in recent decades as Supreme Court decisions have (controversially) held that certain behaviors that were previously per se violations should be analyzed under the rule of reason instead.<sup>52</sup>

Rule of reason analysis is intended to determine the actual effects of particular conduct.<sup>53</sup> It contemplates a three-step analysis:

<sup>&</sup>lt;sup>47</sup> See, e.g., United States v. Topco Assocs., 405 U.S. 596, 610 (1972) ("Antitrust laws in general, and the Sherman Act in particular, are the Magna Carta of free enterprise."); Appalachian Coals, Inc. v. United States, 288 U.S. 344, 359-60 (1933) ("As a charter of freedom, the Act has a generality and adaptability comparable to that found to be desirable in constitutional provisions."). <sup>48</sup> 15 U.S.C. § 1 (2018).

<sup>&</sup>lt;sup>49</sup> Standard Oil Co. of N. J. v. United States, 221 U. S. 1, 59-60 (1911); Ohio v. American Express Co., 138 S. Ct. 2274, 2283 (2018) ("This Court has long recognized that, '[i]n view of the common law and the law in this country' when the Sherman Act was passed, the phrase 'restraint of trade' is best read to mean 'undue restraint.") (quoting *Standard Oil*).

<sup>&</sup>lt;sup>50</sup> See, e.g., American Express, 138 S. Ct. at 2283-84.

<sup>&</sup>lt;sup>51</sup> Id.

<sup>&</sup>lt;sup>52</sup> See, e.g., Continental Television Inc. v. GTE Sylvania Inc., 433 U.S. 36 (1977) (non-price vertical restraints); State Oil v. Khan, 522 U.S. 3 (1997) (maximum resale price maintenance agreements); Leegin Creative Leather Products, Inc. v. PSKS, Inc., 551 U.S. 877 (2007) (minimum resale price maintenance agreements); *see also American Express*, 138 S. Ct. 2274 (holding 5-4 that American Express's contract limitations on merchants were permissible under the rule of reason).

<sup>&</sup>lt;sup>53</sup> Copperweld Corp. v. Independence Tube Corp., 467 U. S. 752, 768 (1984); see also Erik Hovenkamp, *Platform Antitrust*, 44 J. CORP. L. 713, 716 (2020) ("[The

[T]he plaintiff has the initial burden to prove that the challenged restraint has a substantial anticompetitive effect that harms consumers in the relevant market. If the plaintiff carries its burden, then the burden shifts to the defendant to show a procompetitive rationale for the restraint. If the defendant makes this showing, then the burden shifts back to the plaintiff to demonstrate that the procompetitive efficiencies could be reasonably achieved through less anticompetitive means.<sup>54</sup>

Plaintiffs may also be able to triumph if, at the third step, they establish "that the legitimate objective does not outweigh the harm that competition will suffer, i.e., that the agreement 'on balance' remains unreasonable."<sup>55</sup>

Often, a plaintiff seeking to establish anticompetitive effects must establish that the defendants have "market power."<sup>56</sup> In practice, this inquiry often turns on defendants' market share.<sup>57</sup> Defendants' market share, in turn, is closely related to the level of concentration in the market: In a highly concentrated market, a

<sup>57</sup> As the Eleventh Circuit has stated,

rule of reason] channel[s] inter-party adversity to help guide courts toward the right answers when the questions are hard. It is designed to break down complex problems into manageable parts; to identify and compare countervailing effects; and to . . . efficient[ly] divi[de] burdens to maximize the number of useful findings that can be applied toward a final decision.").

<sup>&</sup>lt;sup>54</sup> American Express, 138 S. Ct. at 2284.

<sup>&</sup>lt;sup>55</sup> *Id.* at 2291 (Breyer, J., dissenting) (quoting 7 AREEDA & HOVENKAMP ¶1507a at 442).

<sup>&</sup>lt;sup>56</sup> Plaintiffs can establish anticompetitive effects with direct evidence that the behavior at issue has produced anticompetitive consequences in the relevant market, such as reducing output, increasing prices, or lowering product quality. *Id.* Plaintiffs frequently opt to establish anticompetitive effect indirectly. *See, e.g.*, Tops Markets, Inc. v. Quality Markets, Inc., 142 F.3d 90, 96-98 (2d Cir. 1998); Spanish Broadcasting v. Clear Channel, 376 F.3d 1065, 1069 (11th Cir. 2004). To do so, plaintiff must establish that defendants have market power, and must also bring forth "some evidence that the challenged restraint harms competition." *American Express*, 138 S. Ct. at 2284.

Market power is the ability to raise price significantly above the competitive level without losing all of one's business. Market share is frequently used in litigation as a surrogate for market power for two reasons. First, market power is conceptually difficult to define in any given case. Second, its measurement requires sophisticated econometric analysis. Therefore, market power is not well suited to presentation in an adversary proceeding.

Graphic Products Distributors, Inc. v. Itek Corp., 717 F.2d 1560, 1564 (11th Cir. 1983); *see also, e.g., Spanish Broadcasting*, 376 F.3d 1065; *Tops Markets*, 142 F.3d 90; Valley Liquors, Inc. v. Renfield Importers, Ltd., 678 F.2d 742, 745 (7th Cir.1982).

small group of defendants will often have sizable market share. For example, consider an industry that features three firms of roughly equal size. In a suit alleging an illegal agreement among two of those firms, the defendants command a combined market share of two-thirds. Conversely, in a highly unconcentrated market, even a large group of defendants may have a small combined market share.<sup>58</sup> Thus, the level of concentration in an industry directly and significantly affects an antitrust plaintiff's likelihood of success.

The ability of additional firms to enter the market is also an important consideration when evaluating market power. As the Second Circuit stated in *Tops Markets*, "[C]ourts generally allow the defendant to rebut inferences of market power by showing easy entry conditions."<sup>59</sup> The logic is that, when entry is easy, new competitors are always waiting in the wings. If existing firms raise their prices to supra-competitive levels, new firms will flood into the industry, which will push prices back down.<sup>60</sup>

Second, Courts have interpreted Section 1's "contract, combination . . . or conspiracy" language to require an agreement among firms. Industry-wide supra-competitive pricing absent an agreement, sometimes referred to as "conscious parallelism," is not itself illegal. In the words of Justice Breyer:

Courts have noted that the Sherman Act prohibits *agreements*, and they have almost uniformly held . . . [that] individual pricing decisions (even when each firm rests its own decision upon its belief that competitors will do the same) do *not* constitute an unlawful agreement under section 1 of the Sherman Act. That is not because such pricing is desirable (it is not), but because it is close to impossible to devise a judicially enforceable remedy for "interdependent" pricing. How does one order a firm to set its prices

<sup>&</sup>lt;sup>58</sup> Consider a market with one thousand firms of roughly equal size. Even a suit alleging agreement by fifty such firms would mean that defendants have only 5% market share, combined.

<sup>&</sup>lt;sup>59</sup> *Tops Markets*, 142 F.3d at 99 (quoting PHILLIP E. AREEDA & HERBERT HOVENKAMP, ANTITRUST LAW (1996)); *see also* Int'l Dist'n Ctrs, Inc. v. Walsh Trucking Co., 812 F.2d 786, 792 (2d Cir. 1987); Oahu Gas Serv., Inc. v. Pacific Resources Inc., 838 F.2d 360, 366 (9th Cir. 1988) ("A high market share, though it may ordinarily raise an inference of monopoly power, will not do so in a market with low entry barriers").

<sup>&</sup>lt;sup>60</sup> See, e.g., Ball Mem'l Hosp., Inc. v. Mutual Hosp. Ins., Inc., 784 F.2d 1325, 1335 (7th Cir. 1986) ("[T]he lower the barriers to entry . . . the less power existing firms have.").

# *without* regard to the likely reactions of its competitors?<sup>61</sup>

Section 1 does not require an explicit, formal agreement among competitors; an agreement may be implicit, and can be inferred from circumstantial evidence. Supra-competitive pricing, combined with one or more "plus factors," can allow a factfinder to infer an agreement. For example, courts have found that communication among firms prior to an industry-wide price increase, an industry's history of collusion, and practices that facilitate coordinated pricing, such as announcing price changes before they go into effect, can all suggest an agreement to raise prices.<sup>62</sup>

Another plus factor is whether firms' actions demonstrate a "conscious commitment to a common scheme."<sup>63</sup> This can arise if firms have acted in ways that would only make sense if conducted pursuant to an underlying agreement among them.<sup>64</sup> Similarly, it can also arise if firms engage in behavior that is only economically rational if all other firms in the industry engage in the same behavior.<sup>65</sup> Attempts to coerce a rival to act in particular ways can qualify.<sup>66</sup> Coercion can take a variety of forms, ranging from simply calling a competitor and complaining<sup>67</sup> to more economically injurious behaviors.

<sup>&</sup>lt;sup>61</sup> Clamp-All Corp. v. Cast Iron Soil Pipe Inst., 851 F.2d 478, 484 (1st Cir. 1988); *see also* Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209, 227 (1993).

<sup>&</sup>lt;sup>62</sup> See, e.g., Blomkest Fertilizer, Inc. v. Potash Corp. of Sask., 203 F.3d 1028, 1039 (8th Cir. 2000); United States v. Foley, 598 F.2d 1323 (4th Cir. 1979); GAVIL ET AL., *supra* note 5, at 277, 282-83.

<sup>&</sup>lt;sup>63</sup> See, e.g., Monsanto Co. v. Spray-Rite Serv. Corp., 465 U.S. 752, 768 (1984) (quoting Edward J. Sweeney & Sons, Inc. v. Texaco, Inc., 637 F.2d 105, 111 (3d Cir. 1980)); Va. Vermiculite, Ltd. v. Historic Green Springs, Inc., 307 F.3d 277, 281 (4th Cir. 2002); Toscano v. Prof'l Golfers Ass'n, 258 F.3d 978, 983 (9th Cir. 2001); Spectators' Communication Network Inc. v. Colonial Country Club, 253 F.3d 215, 220 (5th Cir. 2001); Blomkest Fertilizer, Inc., 203 F.3d at 1039 (Gibson, J., dissenting); *In re* Baby Food Antitrust Litig., 166 F.3d 112, 117 (3d Cir. 1999); see also Gregory J. Werden, *Economic Evidence on the Existence of Collusion: Reconciling Antitrust Law with Oligopoly Theory*, 71 ANTITRUST L.J. 719, 777 (2004).

<sup>&</sup>lt;sup>64</sup> GAVIL ET AL., *supra* note 5, at 283.

<sup>&</sup>lt;sup>65</sup> Id.

<sup>&</sup>lt;sup>66</sup> See, e.g., Beech Cinema Inc. v. Twentieth Century-Fox Film Corp., 622 F.2d 1106 (2d Cir. 1980); Modern Home Ins. v. Hartford Acc. & Indem. Co., 513 F.2d 102, 111 (2d Cir. 1975); *In re* Nasdaq Market-Makers Antitrust Litigation, 894 F. Supp. 703, 713 (S.D.N.Y. 1995).

<sup>&</sup>lt;sup>67</sup> Foley, 598 F.2d 1323; In re Nasdaq Market-Makers Antitrust Litigation, 894 F. Supp. at 703.

antitrust law Finally. also attempts to prevent anticompetitive behavior before it occurs.<sup>68</sup> In particular, certain mergers require review and approval by antitrust authorities before they can proceed. The underlying concern is that mergers consolidate an industry, making firms fewer and larger, thereby facilitating collusion or monopolization.<sup>69</sup> In evaluating mergers, the degree of concentration within an industry is a key factor. If an industry is sufficiently concentrated, or a merger will increase the concentration level of the industry by a sufficient amount, the DOJ and FTC presume that it is anticompetitive.<sup>70</sup> The reverse is also true; if industry concentration post-merger is below a certain level, the merger can avoid agency review entirely.<sup>71</sup> The direct incorporation of the Concentration Principle into agency guidelines is but one of the many ways that antitrust law reflects antitrust theory—a topic to which we now turn.

## B. Antitrust Theory

A large body of antitrust literature models firms' and consumers' behavior under a range of assumptions.<sup>72</sup> Many of these variations build from the same starting point (the "Classical Model").<sup>73</sup>

<sup>&</sup>lt;sup>68</sup> In addition to the merger review discussed herein, Section 2 of the Sherman Act prohibits attempts and conspiracies to monopolize. 15 U.S.C. § 2 (2018).

<sup>&</sup>lt;sup>69</sup> HMG, *supra* note 5, at 15.

<sup>&</sup>lt;sup>70</sup> *Id.* at 19.

<sup>&</sup>lt;sup>71</sup> Id.

<sup>&</sup>lt;sup>72</sup> See, e.g., MAS-COLLEL, supra note 5, at 383-428. There are entire textbooks devoted to antitrust economics; unfortunately, we cannot cover the entire field here for reasons of space. However, for interested readers, we note a few topics that bear some relation to our work in this article. See, e.g., B. Douglas Bernheim & Michael D. Whinston, Multimarket Contact and Collusive Behavior, 21 RAND J. ECON. 1 (1990) (modeling how firms that interact with each other across multiple industries have greater ability to collude because they have greater ability to punish each other, and that this dynamic poses a challenge to standard heuristics for market concentration); Chaim Fershtman & Neil Gandal, Disadvantageous Semicollusion, 12 INT'L J. INDUS. ORG. 141 (1994) (arguing that firms may collude on one dimension, such as price, while competing on other dimensions, such as product quality, that are harder to observe and thus to police); Mort I. Kamien et al., Bertrand Competition with Subcontracting, 20 RAND J. ECON. 553 (1989) (modeling dynamics of horizontal subcontracting in a one-period game); Volker Nocke & Lucy White, Do Vertical Mergers Facilitate Upstream Collusion?, 97 AM. ECON. REV. 1321 (2007) (modeling dynamics pertaining to vertical integration).

<sup>&</sup>lt;sup>73</sup> We refer to "the" Classical Model for simplicity. However, a more precise formulation would posit two Classical Models: the Bertrand Model, discussed here, in which firms compete by setting their prices, and the Cournot Model, in which firms compete by setting their production quantities. *See, e.g.*, MAS-COLLEL, *supra* note 5, at 387-94. Both models share many important

The Classical Model posits a group of firms and consumers who play a "repeated game."<sup>74</sup> Essentially, this means that firms interact repeatedly over a long period of time, and that they have memories—firms can take past interactions into account when deciding how to act in later periods.<sup>75</sup>

In each period, each firm sets the price at which it is willing to sell. Firms are homogenous; they all produce the same product and have the same costs of production.<sup>76</sup> Consumers take prices into account, and purchase products at the lowest price they can.<sup>77</sup>

Firms discount their profits based on when they earn them; a dollar earned in the first period is more valuable than one earned in the second period, a dollar earned in the second period is more valuable than one earned in the third period, and so on.<sup>78</sup> A parameter called the "discount factor" captures how much future profits are discounted relative to present profits.<sup>79</sup> The larger the discount factor, the less the value of a dollar declines from one period to the next. In other words, when the discount factor is larger, future profits are relatively more important, and thus count for more in a firm's decision-making process.

In general, the game's outcomes of interest are those that constitute Nash Equilibria—that is, those scenarios in which each firm and each consumer behaves in a way that provides it with the

commonalities; in particular, firms interact solely as competitors and would be happy if their rivals disappeared.

<sup>&</sup>lt;sup>74</sup> *Id.* at 400-05.

<sup>&</sup>lt;sup>75</sup> Consumers have memories and can act on them, too, but they are generally assumed to be too small, or to be in the market for too short a period of time, for the effect to matter.

<sup>&</sup>lt;sup>76</sup> Variations on the base model treat firms as having products with different features or different production capacities. *See, e.g.*, A. Dixit & J.E. Stiglitz, *Monopolistic Competition and Optimal Product Diversity*, 67 AM. ECON. REV. 297 (1977).

<sup>&</sup>lt;sup>77</sup> If multiple firms offer the same price, consumers split their purchases among those firms. They can also be modeled as randomly choosing among the firms with the lowest price.

There is also an extensive literature on non-price competition among firms. See, e.g., MAS-COLLEL, supra note 5, at 395-400; Dixit & Stiglitz, supra note 76; S. Salop, Monopolistic Competition with Outside Goods, 10 BELL J. ECON. 141 (1979); A.M. Spence, Product Selection, Fixed Costs, and Monopolistic Competition, 43 REV. ECON. STUD. 217 (1976); see also Fershtman & Gandal, supra note 72.

<sup>&</sup>lt;sup>78</sup> For instance, to give up \$1 today, a firm might require that it be paid \$1.10 one period from now, \$1.21 two periods from now, or \$1.33 three periods from now, and so forth. This tracks conventional finance theory about discount rates and the time value of money. *See, e.g.*, IVO WELCH, CORPORATE FINANCE (4th ed. 2018). <sup>79</sup> The discount factor is between 0 and 1. In the example of footnote 78, the discount factor implies a 10% discount rate per period.

best possible outcome, given what everyone else is doing.<sup>80</sup> Nash Equilibria are useful conceptually because they are, in a particular sense, rational and stable: Because everyone's actions are a best response to everyone else's, each actor behaves consistently with her own self-interest. In other words, no one has a course of action available to her that would make her better off. As a result, no one has an incentive to change her behavior. Accordingly, reasoning that no one will deviate from a Nash Equilibrium, and that such an outcome will therefore persist, seems defensible.<sup>81</sup>

There are a large number of potential Nash Equilibria under the Classical Model.<sup>82</sup> From an antitrust perspective, one is of particular interest: the Nash Equilibrium that is best for firms as a group and worst for consumers as a group. This Nash Equilibrium represents, in a sense, an outer bound on the worst possible outcome that can be sustained by firms' self-interest.<sup>83</sup> We term this the "Collusion-Maximizing Outcome."

Under the Collusion-Maximizing Outcome, each firm sets its price at the monopoly price each period. If all firms do this, they split the market evenly among themselves and each reaps a fraction of monopoly profits. As a group, firms earn monopoly profits, the largest amount of profits that they can hope to earn.<sup>84</sup> Consumers, in contrast, do poorly. The competitive price—the price that vigorous competition would produce—is lower than the monopoly price. This means consumers must pay more for the good than they would in a competitive market.<sup>85</sup>

If any firm deviates from the strategy described above—for example, by lowering its price in order to make more sales—the

<sup>&</sup>lt;sup>80</sup> More precisely, one might wish to focus on subgame-perfect Nash Equilibria. These are Nash Equilibria in which each actor's prescribed action is a best response for that actor at the time it is undertaken. This eliminates, for example, equilibria built on threats that are not credible. All of the equilibria that we discuss are subgame-perfect Nash Equilibria.

<sup>&</sup>lt;sup>81</sup> There are also variants in which groups are the unit of analysis instead of individual actors—i.e., one considers whether there are any groups of actors that can make themselves better off by changing their behavior in a coordinated fashion. *See* ROGER B. MYERSON, GAME THEORY: ANALYSIS OF CONFLICT 427-36 (1991); Jordan M. Barry et al., *On Derivatives Markets and Social Welfare: A Theory of Empty Voting and Hidden Ownership*, 99 U. VA. L. REV. 1103, 1139-40 (2013).

<sup>&</sup>lt;sup>82</sup> J. Friedman, *A Non-Cooperative Equilibrium for Supergames*, 38 REV. ECON. STUD. 1 (1971).

<sup>&</sup>lt;sup>83</sup> This outcome is worst for consumers; for firms, this is the best outcome.

<sup>&</sup>lt;sup>84</sup> This is essentially the definition of monopoly profits; a monopolist can pick any spot she likes on the demand curve, and thus picks the one that is best for her.

<sup>&</sup>lt;sup>85</sup> HAL R. VARIAN, INTERMEDIATE MICROECONOMICS 405-07 (4th ed. 1996).

other firms retaliate by slashing their prices. More specifically, firms stop setting their prices at the monopoly level and instead price at their cost of production in all future periods. This response, known as a "grim trigger," is quite harsh; if a firm lowers its price once—by even a small amount—the grim trigger guarantees that no firm ever earns a profit again. From the firms' perspective, this is the worst possible outcome.<sup>86</sup>

Yet a powerful logic underlies the harshness of the grim trigger. It is best for the firms as a group if they can maintain their collusion, under which all firms offer consumers the monopoly price. Firms thus want to make "not deviating" from collusive pricing as attractive as possible compared to "deviating."

Consider the choice that a firm faces when deciding whether to cut its price, thereby deviating from the Collusion-Maximizing Outcome. A small price reduction is immediately profitable for the firm: The lower price will attract more customers. And, while the lower price means the firm will receive slightly less per sale, for a small price cut the increase in sales will more than make up the difference.<sup>87</sup> In the short run, deviating raises a firm's profits.

To counteract this, other firms want a deviation to cost the deviating firm as much future profit as possible. The grim trigger causes a deviating firm to lose *all* of its future profits. Thus, it is the biggest threat that firms can bring to bear against would-be deviators. Accordingly, the grim trigger makes collusion as attractive as possible, thereby maximizing the circumstances under which the industry can maintain collusion.

However, in certain circumstances, even the grim trigger is not enough to deter deviations. When this happens, collusion breaks down and firms compete aggressively for business, which drives prices down to firms' cost of production. This is the worst outcome from firms' perspective, but the best from consumers' and society's.<sup>88</sup>

<sup>&</sup>lt;sup>86</sup> Grim triggers represent an entire class of strategies. This particular strategy is also sometimes referred to as Bertrand Reversion. *See, e.g.*, Syndicated Markets, *supra* note 44.

<sup>&</sup>lt;sup>87</sup> More precisely, cutting its price a small amount increases a firm's profits in the current period, as the drop in profits per sale is more than offset by an increased number of sales. Cutting its price by a large enough amount (to zero, for example) would not increase the firm's current-period profits.

<sup>&</sup>lt;sup>88</sup> VARIAN, *supra* note 85, at 301.

Two parameters of the Classical Model are of particular importance in determining whether the grim trigger is sufficient to maintain collusion: the discount factor and the number of firms.

The discount factor matters because whether collusion is sustainable depends on the relative value of present profits (which are maximized by deviating) and future profits (which are maximized by colluding). The larger the relative value of future profits, the easier it is to maintain collusion. The discount factor determines the relative importance of the future compared to the present.

The number of firms matters because, under the Collusion-Maximizing Outcome, firms split monopoly profits among themselves each period. When more firms divide up the same total amount of profit, each colluding firm earns less. In contrast, a deviating firm will be the only firm offering the lowest price in the period that it deviates, and thus will reap large profits that period. Therefore, the more firms there are, the more attractive deviation becomes and thus the harder it becomes to sustain collusion.

Under the Classical Model, for any given discount factor, there is some number of firms that serves as a cutoff for when collusion can be maintained. When the number of firms is below this threshold, firms find colluding more profitable than deviating. Consequently, they can maintain the Collusion-Maximizing Outcome and maximize their combined profits. When the number of firms rises above this threshold, however, everything falls apart. Each firm finds deviating to be more attractive than colluding, which means that firms end up competing with each other. Competition drives total firm profits down to zero, their minimum possible level.<sup>89</sup> Thus, economic theory predicts that the number of firms in a market is extremely important for determining whether the market will be characterized by competition or collusion among firms.

Figure 1 below illustrates these dynamics graphically for a particular set of parameters.<sup>90</sup> In this example, the competitive price is 1 and the monopoly price is 25. The far left side of the graph represents an infinitely un-concentrated industry, composed of numerous tiny firms, while the far right side represents an industry

<sup>&</sup>lt;sup>89</sup> This means zero economic profits, not zero literal profits. *Id.* at 391-92.

<sup>&</sup>lt;sup>90</sup> The discount factor is such that firms value \$1 in one period at \$0.75 now.

comprised of a single, large firm.<sup>91</sup> When concentration is high enough, firms can collude at the monopoly price.<sup>92</sup> When concentration drops below a threshold, no collusion is possible and the industry reverts to competitive pricing.





Market Concentration

A slight clarification is in order before continuing. The Classical Model assumes that all firms are identical, but in practice this is not the case; firms vary in size and hence in capacity. This is relevant when considering market dynamics. For example, if there are a hundred firms in a market, but one is much larger than all of the rest combined, the market may be more akin to a market with only one firm than to a market with a hundred. The concentration of the market, which includes both the number and relative sizes of producers in the market, is a better measure of the state of the market

<sup>&</sup>lt;sup>91</sup> The zero bound on concentration is not achievable because we assume a finite number of firms, but we can get arbitrarily close to it by considering scenarios with appropriately large numbers of firms.

<sup>&</sup>lt;sup>92</sup> Market concentration is defined as a fraction equal to one divided by the number of firms. When firms are of equal size, as they are here, this measures market concentration well. The highest possible market concentration is 1, when there is only a single firm; the lowest is 0, when there are infinitely many firms. Market concentration in this instance can only take on discreet values; however, we display a continuous line for visual and conceptual clarity.

than the number of firms alone.<sup>93</sup> Variations on the Classical Model account for this and, as noted previously, so does antitrust law.<sup>94</sup>

#### **III** COLLABORATIVE INDUSTRIES

The Classical Model makes assumptions about the ways that firms interact with each other. In particular, it assumes that firms do not transact with each other directly; firms only transact with consumers. Firms are fundamentally competitors, who would be perfectly happy if their rivals suddenly ceased to exist.

In practice, relationships among firms are often more complex than the Classical Model envisions.<sup>95</sup> We refer to industries in which direct interactions between firms are both common and important as "Collaborative Industries."<sup>96</sup> In Collaborative Industries, firms can potentially reap large gains from working together, independent of the prices that they charge consumers. This is not true in classical industries. Firms in Collaborative Industries thus have more mechanisms to reward or punish each other than the Classical Model contemplates.

For instance, consider the market for legal services. Yes, lawyers and firms compete with each other for clients. But many transactions, and almost all lawsuits, can only be completed if unrelated attorneys work on both sides. Managing a lawsuit through the discovery process, or a contract through negotiations and drafting, requires repeated interaction with opposing counsel and offers many opportunities to make things easier or more difficult for the other side. Counsel can agree to extend filing deadlines, consent to reschedule motion hearings, and choose whether to file motions mid-week or right before a holiday weekend. Larger matters often

<sup>&</sup>lt;sup>93</sup> See DOJ, IDENTIFYING VIOLATIONS, *supra* note 34, at 5 ("Collusion may ... occur when the number of firms is fairly large, but there is a small group of major sellers and the rest are 'fringe' sellers who control only a small fraction of the market.").

<sup>&</sup>lt;sup>94</sup> See Part II.A, supra.

<sup>&</sup>lt;sup>95</sup> See, e.g., GAVIL ET AL., *supra* note 5, at 80 ("Partnerships, joint ventures and strategic alliances among rivals are ubiquitous..."); *see also* sources cited in note 72, *supra*.

<sup>&</sup>lt;sup>96</sup> We note that the extent to which an industry is a Collaborative Industry is a matter of degree, not of kind. Many industries feature some cooperative interaction among rivals; the question is the relative importance of such interactions compared to standard competition for business. The same is true of Syndicated Markets and Brokered Markets. The exact boundaries of these terms, and thus the precise classifications of specific industries, are of little consequence to our larger analysis. *Cf.* Elizabeth Pollman & Jordan M. Barry, *Regulatory Entrepreneurship*, 90 S. CAL. L. REV. 383, 397 (2017).

feature multiple counsel on each side of a lawsuit or transaction, creating further opportunities for non-competitive interaction.

For a practicing lawyer, a colleague may be a competitor in certain areas but a source of business in others. Consider Alice and Bob, two lawyers with broad generalist practices, each of whom also has different specialized expertise; Alice is a securities guru, while Bob is a bankruptcy expert. Alice and Bob may compete for general business litigation or transactional work. However, when Alice encounters a complicated bankruptcy issue, she may bring in Bob to address it. Bob may act similarly when he encounters securities law questions. An attorney can also find herself unable to take on a new matter due to a conflict of interest, or because she already has too many engagements. When this happens, she can choose to refer the new matter to a competitor. For many attorneys, such referrals are an important source of business.<sup>97</sup>

Thus, while the market for legal services certainly features competition, attorneys do not view other attorneys solely as competitors who they wish would disappear. Indeed, without plaintiffs' attorneys or prosecutors, defense counsel would have no practice.

Law is not unique in this regard; there are many other Collaborative Industries.<sup>98</sup> Sports leagues are a famous example; no matter how much Michigan fans may loathe Ohio State,<sup>99</sup> they would have little to cheer if every non-Michigan team disbanded. Rivals frequently share technology through a variety of mechanisms.<sup>100</sup> For instance, technology companies, including Intel, IBM, and Hewlett-Packard, regularly enter into cross-

<sup>&</sup>lt;sup>97</sup> Many attorneys who leave a large firm to found a smaller one find referrals by their former co-workers to be an important source of business. Such referrals are typically matters that are too small for the large firm to handle economically.

<sup>&</sup>lt;sup>98</sup> One of our favorite examples pertains to contexts, such as municipal contracting, in which decisionmakers must obtain multiple bids before awarding work. Yet a decisionmaker may prefer—for reasons noble, venal, or both—to hire a particular firm for a project ("Firm A"). In such instances, she will sometimes contact Firm A and state her desire to award it a contract. She will ask Firm A to submit a bid, and to have one or more competitors submit one as well. Firm A will then contact competitors and request that they submit bids, with the understanding that by doing so, they are helping Firm A to secure the contract; competitors generally oblige and submit non-aggressive bids. Other firms will make similar requests of Firm A in turn, and Firm A returns the favor.

<sup>&</sup>lt;sup>100</sup> See, e.g., Jonathan M. Barnett, *The Host's Dilemma: Strategic Forfeiture in Platform Markets for Informational Goods*, 124 HARV. L. REV. 1861 (2011) ("[Rival] firms have formed nonprofit consortia and other cooperative arrangements . . . in order to develop operating systems for the smartphone market.").

licensing agreements that allow rivals to use each other's patented technologies.<sup>101</sup> These agreements often provide access to future patents, enabling collaboration for years to come.<sup>102</sup> Craft breweries "don't view others in their field as enemies"; instead, they frequently "share secrets, work together . . . and encourage up-and-coming breweries."<sup>103</sup> Some brewers even lend money to new breweries to help them get started.<sup>104</sup> Similarly, many technology companies have joined with competitors to conduct research that may benefit them both;<sup>105</sup> to name a few examples, Texaco has partnered with Chevron, Apple with Dell, and Texas Instruments with AMD.<sup>106</sup> Companies often join multiple research joint ventures simultaneously, creating sizable networks that can span the industry.<sup>107</sup> Rival pharmaceutical companies conduct joint drug trials. For example, Gilead Sciences and Roche Pharmaceuticals are conducting a joint study to see if Gilead's remdesivir and Roche's tocilizumab are more effective against coronavirus in combination

<sup>&</sup>lt;sup>101</sup> See, e.g., Carl Shapiro, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting, in 1 INNOVATION POLICY AND THE ECONOMY 119 (Adam B. Jaffe et al. eds., 2001); see also Erik Hovenkamp & Herbert Hovenkamp, Patent Pools and Related Technology Sharing, in CAMBRIDGE HANDBOOK OF ANTITRUST, INTELLECTUAL PROPERTY, AND HIGH TECH (Roger D. Blair & D. Daniel Sokol, eds. 2017) (discussing patent pools, in which firms combine related patent rights into a joint pool that all contributors, and some outsiders, can access); Jonathan M. Barnett, The Anti-Commons Revisited, 29 HARV. J.L. & TECH. 127 (2015).

<sup>&</sup>lt;sup>102</sup> Shapiro, *supra* note 101, at 129-30. Rivals also agree on standards, which often involves coordination via a standard-setting organization and the commitment of holders of standard-essential patents to license to rivals on fair, reasonable, and nondiscriminatory terms. *See, e.g.*, Erik Hovenkamp, *Tying, Exclusivity, and Standard-Essential Patents*, XIX COLUM. SCI & TECH. L. REV. 79 (2017) (discussing same and how such precommitments may be undercut via tying); *see also* Jonathan M. Barnett, *Antitrust Overreach: Undoing Cooperative Standardization in the Digital Economy*, 25 MICH. TELECOMM. & TECH. L. REV. 163 (2019); Jonathan M. Barnett, *From Patent Thickets to Patent Networks: The Legal Infrastructure of the Digital Economy*, 55 JURIMETRICS 1 (2014).

<sup>&</sup>lt;sup>103</sup> Chris Morris, *3 Essential Business Growth Lessons from the Craft Beer Boom*, CNBC.COM, June 3, 2016, https://www.cnbc.com/2016/06/03/3-essential-business-growth-lessons-from-the-craft-beer-boom.html. As Sam Calagione, founder of Dogfish Head, describes, "By and large, we all help each other and share ideas, do events or make actual beers that are collaborative." *Id.* <sup>104</sup> *Id.* 

<sup>&</sup>lt;sup>105</sup> Tomaso Duso et al., *Collusion Through Joint R&D: An Empirical Assessment*, 96 REV. ECON. & STAT. 349, 349 (2014) ("[R]esearch joint ventures . . . are a prominent phenomenon especially in many high-tech sectors of the economy"). <sup>106</sup> *Id.* at 350 n.8.

<sup>&</sup>lt;sup>107</sup> *Id.* at 349, 350 n.9 (noting six linked petroleum firms, sixteen linked computer firms, and twenty-one industrial machinery firms); John William Hatfield & Scott Duke Kominers, *Multilateral Matching*, 156 J. ECON. THEORY 175 (2015).

than either is alone.<sup>108</sup> Another study is examining remdesivir in combination with Eli Lilly's baricitinib.<sup>109</sup>

Moreover, the extent to which an industry is a Collaborative Industry is a matter of degree, not of kind.<sup>110</sup> Many industries feature a non-zero amount of cooperative interaction among rivals; for example, an industry in which firms lobby for similar government policies has a collaborative dimension.<sup>111</sup> The key question is the relative importance of such interactions compared to standard competition for business:<sup>112</sup> The more collaborative interactions that firms have, and the more important they are relative to interfirm competition for customers, the more collaborative the industry.

While there are many Collaborative Industries, two broad classes are of particular relevance for this Article and thus merit extra attention: Syndicated Markets and Brokered Markets.<sup>113</sup>

#### A. Syndicated Markets

In many industries, firms compete against each other to win contracts, and then collaborate with each other in order to fulfill those contracts. Markets with this general structure are known as Syndicated Markets.<sup>114</sup>

An example helps illustrate this point. Consider the IPO Underwriting Market. In an IPO, an underwriter purchases stock from a privately held company (the "issuer") and then re-sells that stock to interested investors shortly thereafter. Underwriters profit by charging the issuer a percentage of the total funds raised in the

<sup>&</sup>lt;sup>108</sup> See, e.g., Roche, Gilead To Test Drug Cocktail Against Severe COVID-19, BARRON'S, May 28, 2020, https://www.barrons.com/news/roche-gilead-to-test-drug-cocktail-against-severe-covid-19-01590662104.

<sup>&</sup>lt;sup>109</sup> Wes Mills, *Lilly Teams with Gilead for Potential COVID-19 Treatment*, INSIDE INDIANA BUSINESS, May 11, 2020, https://www.insideindianabusiness.com/story/42114332/lilly-teams-with-gilead-for-potential-covid19-treatment.

<sup>&</sup>lt;sup>110</sup> See *supra* note 96.

<sup>&</sup>lt;sup>111</sup> The collaborative transaction in this example is lobbying. Firms could punish a price deviator by not contributing to a joint industry lobbying fund, or by reducing lobbying efforts that would benefit the price deviator. <sup>112</sup> Of Bellman 9, Berger summaries O(x) = 1207

<sup>&</sup>lt;sup>112</sup> Cf. Pollman & Barry, supra note 96, at 397.

<sup>&</sup>lt;sup>113</sup> Again, the exact boundaries of the terms Syndicated Markets and Brokered Markets, and thus the precise classifications of specific industries, are of little consequence to our larger analysis.

<sup>&</sup>lt;sup>114</sup> This behavior is also referred to as horizontal subcontracting. *See, e.g.*, Y. Spiegel, *Horizontal Subcontracting*, 24 RAND J. ECON. 570 (1993).

IPO. This percentage is known as a "spread."<sup>115</sup> For example, suppose investors paid a total of \$100 million for an issuer's stock. If the spread was 2%, the issuer would receive \$98 million and the underwriter would pocket the remaining \$2 million.

Underwriting firms compete with each other to win business from issuers. However, once that competition is over and the issuer has selected its lead underwriter, that lead underwriter often subcontracts significant portions of the underwriting work to other underwriters. The lead underwriter, along with those underwriters with which it subcontracts, jointly form an underwriting syndicate that works together to find buyers for all of the stock that the issuer wishes to sell.

Syndication is extremely common in the IPO Underwriting Market; 97% of mid-size U.S. IPOs conducted between 1970 and 2014 were syndicated.<sup>116</sup> Many other financial markets are also syndicated, including the debt, reinsurance, venture capital, and private equity markets.<sup>117</sup> Nor is syndication limited to finance. Both construction and automotive manufacturing are commonly syndicated.<sup>118</sup> Telecommunications firms service clients by renting capacity from their direct competitors.<sup>119</sup> The aircraft, computer, and transportation industries all feature syndication.<sup>120</sup> Other examples abound.<sup>121</sup>

Economists generally agree that syndicated production is driven by cost savings to joint production. A group of firms brings more resources to bear than any individual firm, which enables

<sup>&</sup>lt;sup>115</sup> Syndicated Markets, supra note 44, at 3783.

<sup>&</sup>lt;sup>116</sup> We define a mid-sized IPO as one in which the issuer sold between \$20 and \$100 million worth of stock. The Securities Data Company dataset reports 4,576 such IPOs; 4,438 were syndicated. Syndication in the IPO Underwriting Market is not limited to IPOs of this size range; the entire dataset contains 11,982 IPOs for this period, of which 90% were syndicated.

<sup>&</sup>lt;sup>117</sup> See, e.g., Micah S. Officer et al., *Club Deals in Leveraged Buyouts*, 98 J. FIN. ECON. 214 (2010); *Syndicated Markets, supra* note 44; Jian Cai et al., Loan Syndication Structures and Price Collusion (2018), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=3250817.

<sup>&</sup>lt;sup>118</sup> Spiegel, *supra* note 114. For instance, Ford subcontracted most of the Ford Probe's production to Mazda. James Risen, *Hot Ford Hybrid Is in Short Supply*, L.A. TIMES, May 19, 1998. Ford owned a 25% interest in Mazda at the time.

<sup>&</sup>lt;sup>119</sup> P. Baake et al., *Explaining Cross-Supplies*, 70 J. ECON. 37 (1999).

<sup>&</sup>lt;sup>120</sup> *Id.*; *see also* Rothery Storage & Van Co. v. Atlas Van Lines, Inc., 792 F.2d 210 (D.C. Cir. 1986).

<sup>&</sup>lt;sup>121</sup> See, e.g., New York v. Hendrickson Brothers, Inc., 840 F.2d 1065 (2d Cir. 1988); United States v. Inryco, Inc., 642 F.2d 290 (9th Cir. 1981); Elemary v. Holzmann, 533 F. Supp. 2d 116 (D.C. Cir. 2008); United States v. Anderson, 326 F.3d 1319 (11th Cir. 2003); Miller v. Holzmann, 563 F. Supp. 2d 54 (D.C. Cir. 2008).

cheaper production. That is, the syndicate leader subcontracts to competitors because farming out some of the work is cheaper than completing the entire project on its own. This dynamic is likely to occur when the syndicate leader has limited productive capacity relative to the quantity of output that clients are demanding and when increasing capacity lowers the per-unit cost of production.<sup>122</sup> Industries with these features tend to be those that display significant amounts of syndication.

### B. Brokered Markets

Would-be buyers and sellers often employ agents to facilitate transactions.<sup>123</sup> In some markets ("Brokered Markets"), buyers' and sellers' agents often work together to consummate transactions.<sup>124</sup> For example, a person who wants to buy a share of Microsoft stock would generally contact a stockbroker, who has access to brokers representing many would-be sellers and is thus in a position to effectuate transactions. Prominent examples of Brokered Markets include the securities, commodities, and residential real estate markets. Buy- and sell-side brokers also work together to connect would-be buyers and sellers of businesses,<sup>125</sup> trucking,<sup>126</sup>

<sup>&</sup>lt;sup>122</sup> In the IPO context, underwriters place shares with investors. Each underwriter has a different network of investors, which means that a group of underwriters can reach more investors than any individual underwriter. In other financial contexts, syndication can enable greater diversification, overcome credit constraints, or provide regulatory benefits.

<sup>&</sup>lt;sup>123</sup> For example, brokers are common when it would otherwise be difficult for buyers and sellers to find each other on their own.

 $<sup>^{124}</sup>$  Every transaction in a market need not fit these criteria for the market to constitute a Brokered Market. For example, some individuals buy and sell houses without using brokers, and the same realtor sometimes represents both buyer and seller. The question is whether enough transactions fit these criteria that brokers care about their ability to work with other brokers. *Cf.* note 96, *supra*.

<sup>&</sup>lt;sup>125</sup> See, e.g., Michele Schechter, An Intermediary to Lead the Process: Investment Banker or Business Broker?, FINANCIALPOISE.COM, June 22, 2020, https://www.financialpoise.com/investment-banker-business-broker/.

<sup>&</sup>lt;sup>126</sup> Ari Eshe, *More Double-Brokering Ups Threat to US Truck Shippers*, J. COMM. (Mar. 28, 2018), http://americangloballogistics.com/wpcontent/uploads/JoC\_More-Double-Brokering-Ups-Threat-to-US-Truck-Shippers 03282018.pdf (discussing co-brokering).

shipping,<sup>127</sup> yachts,<sup>128</sup> aircraft,<sup>129</sup> financial derivatives,<sup>130</sup> and numerous other goods and services.<sup>131</sup>

Brokered Markets vary widely in their specifics. An investor who buys a share of Apple stock will likely never know who the seller was, and vice versa; agents carry out the entire transaction. In contrast, business brokers make introductions and provide advice, but the principals do much of the heavy lifting. In some Brokered Markets, individual agents limit themselves to servicing one side of the market (i.e., only buyers or only sellers). In others, such as residential real estate, the same agents service both sides.

But across all Brokered Markets, an agent's ability to connect potential buyers and sellers is vital to her business. Thus, being able to work with other agents, and thereby gain access to those agents' clients, is important. This makes agents interdependent and makes Brokered Markets Collaborative Industries.

Real estate provides a good example; a seller's broker wants other brokers to tell potential buyers about the property, and vice versa. A real estate agent who is shunned by her peers will suffer financially. Similar dynamics apply in other Brokered Markets, such as securities trading. Consider the DOJ's description of NASDAQ market makers' interactions:

The Nasdaq market is highly interdependent, making it easy to enforce compliance with "professional" quoting standards. Market makers rely on each other to provide order flow, information, and cooperation to help them trade

<sup>&</sup>lt;sup>127</sup> See, e.g., Krishna Prasad, Changing Role of Ship-Brokers (draft 2009), https://www.he-

alert.org/filemanager/root/site\_assets/standalone\_article\_pdfs\_0905-/he00915.pdf.

<sup>&</sup>lt;sup>128</sup> See, e.g., Jeanne Craig, *Co-Brokerage: What the Yacht Buyer Needs to Know*, YACHTWORLD.COM, https://www.yachtworld.com/research/co-brokerage-what-the-yacht-buyer-needs-to-know/.

<sup>&</sup>lt;sup>129</sup> See, e.g., Puget Aircraft, *Frequently Asked Questions on Becoming an Aircraft Broker*, http://pugetsoundcommericalaircraftbrokers.com/frequently-asked-questions-on-becoming-an-aircraft-broker/.

<sup>&</sup>lt;sup>130</sup> See, e.g., Yalin Gündüz et al., *Trading Credit Default Swaps via Interdealer Brokers*, 32 J. FIN. SERV. RES. 141 (2007).

<sup>&</sup>lt;sup>131</sup> See, e.g., Veronica Blatt, *What Is a Split Placement?*, NPAWORLDWIDE, July 3, 2018, https://npaworldwide.com/blog/2018/07/03/what-is-a-split-placement/; WILLIAM FINLAY & JAMES COVERDILL, HEADHUNTERS: MATCHMAKING IN THE LABOR MARKET 6 (2002). To be clear, not every transaction in these settings involves rival brokers connecting the buyer and the seller. *Cf.* notes 96 and 124, *supra*.

positions profitably. They actively work to develop and maintain friendly relationships with traders from other firms. Traders do not want other market makers to perceive them as being uncooperative, "unethical," or "unprofessional" because that very perception may result in their loss of access to the trader networks that provide order flow, information, and cooperative trading opportunities.<sup>132</sup>

This passage comes from the DOJ's explanation of how NASDAQ market makers used their mutual dependence to collude at investors' expense.<sup>133</sup> This interdependence proved an impressively stable foundation for collusion: The DOJ's investigation implicated conduct by at least 24 major firms over multiple years<sup>134</sup>—conduct that, prior to outside intervention, showed no signs of abating.<sup>135</sup> The academic work that prompted the DOJ's investigation paints an even more troubling picture.<sup>136</sup>

These dynamics among NASDAQ market makers are not unique. To the contrary, our models provide a formal theoretical foundation for why similar collusion is possible (though by no means assured) in other Collaborative Industries.

#### IV. THE COLLABORATIVE INDUSTRY MODEL

As discussed in Part III, the dynamics among firms in Collaborative Industries differ from those contemplated by the Classical Model. Thus, the predictions of the Classical Model may not apply to Collaborative Industries; we need a new model.

We present a generalized game-theoretic Collaborative Industries Model that builds upon our prior work formally modeling Syndicated Markets and Brokered Markets.<sup>137</sup> We begin by presenting the model's basic mechanics before describing the

 <sup>&</sup>lt;sup>132</sup> U.S. Dep't of Justice Competitive Impact Statement, U.S. v. Alex Brown & Sons (NASDAQ Market Makers), Civ. Action No. 96-5313, at 20 (S.D.N.Y. 1996), *available at* https://www.justice.gov/atr/case-document/file/484141/download [hereinafter DOJ NASDAQ Statement].
<sup>133</sup> Id. at 3.

<sup>&</sup>lt;sup>134</sup> *Id.* at 20.

<sup>&</sup>lt;sup>135</sup> William G. Christie et al., *Why Did NASDAQ Market Makers Stop Avoiding Odd-Eighth Quotes?*, 49 J. FIN. 1841 (1994).

<sup>&</sup>lt;sup>136</sup> William G. Christie & Paul H. Schultz, *Why Do NASDAQ Market Makers Avoid Odd-Eighth Quotes?*, 49 J. FIN. 1813, 1838-39 (1994) (documenting behavior involving at least 60 firms and stretching back multiple years further than the DOJ discusses).

<sup>&</sup>lt;sup>137</sup> See Syndicated Markets, supra note 44; Brokered Markets, supra note 41. As noted previously, not all co-authors of this Article are co-authors of both companion pieces. See footnote 44, supra.

Collusion-Maximizing Outcome. To deter price deviations and maximize collusion, the industry ostracizes any firm that deviates from the collusive scheme. We then explain why, in equilibrium, it is in each individual firm's interest to shun price deviators in this manner, and the implications of this dynamic. Finally, we turn to the key takeaways from our model.

## A. Basic Mechanics

The mechanics of our Collaborative Industries Model track those of the Classical Model as closely as possible, in order to isolate the effects of collaboration on firms' ability to collude. As in the Classical Model, we posit a repeated game played by firms and consumers. Like the Classical Model, in our base case all firms are identical; they each produce the same product and have the same costs of production.<sup>138</sup>

As in the Classical Model, in each period, each firm sets the price at which it is willing to sell, and consumers patronize the firm that offers the lowest price.<sup>139</sup> If multiple firms offer the same price, consumers spread themselves among those firms.

As in the Classical Model, each firm and consumer seeks to maximize its own payoffs. Payoffs track the Classical Model's: Each consumer's payoff is the difference between the value it receives from the goods it purchases and the price that it pays to purchase those goods. Each firm's payoff is its profits—i.e., the difference between its revenues and its costs. Firms discount profit from successive periods in the same way that they do in the Classical Model.<sup>140</sup>

There is one key difference between the Collaborative Industry Model and the Classical Model: In each period, after consumers choose which firms to contract with, firms have the opportunity to profitably collaborate with each other (such profits, "Collaborative Profits").<sup>141</sup> The nature of this collaboration varies, depending on the specifics of the Collaborative Industry in question. But in general, this step involves firms entering into some sort of

<sup>&</sup>lt;sup>138</sup> We also model scenarios in which firms have different productive capacities. *See* Part V.A.1, *infra*.

<sup>&</sup>lt;sup>139</sup> We assume that there are new consumers in each period. As in the Classical Model, this eliminates coordinated consumer behavior (for example, monopsony) and focuses the model on firms' strategic behavior.

<sup>&</sup>lt;sup>140</sup> This is not an issue for consumers, who only exist for a single period.

<sup>&</sup>lt;sup>141</sup> Collaborative Profits may arise from increased revenues, decreased costs, or both. The key point is that collaboration with rivals increases the firm's profits.

transactional business relationship with the potential to benefit all involved.

For example, in our Syndicated Markets Model, firms can collaborate by syndicating production: In each period, after a consumer chooses a firm to contract with, that firm (the "Syndicate Leader") can invite some or all of the other firms to join its syndicate and jointly fulfill the contract together.<sup>142</sup> Syndication is profitable and socially beneficial because production costs fall as more capacity is deployed; bringing in more firms to help fulfill the contract, and thus creates cost savings.<sup>143</sup>

The Brokered Markets Model considers another type of intra-industry collaboration. In that model, firms connect buyers and sellers, who cannot transact directly. The collaborative interaction is that firms form networks; they specify which other firms they will work with, and on what terms.<sup>144</sup> Both a firm and its clients benefit from the firm having a larger network.<sup>145</sup>

Finally, the Collaborative Industry Model generally assumes that firms observe the transactions that other firms propose to each other and consummate.<sup>146</sup> As we will see below, this knowledge helps firms to construct and maintain the Collusion-Maximizing Outcome.

<sup>&</sup>lt;sup>142</sup> We model this as the Syndicate Leader simultaneously offering a contract to whichever firms it chooses. Each invited firm then accepts or rejects its offer. The Syndicate Leader, along with any firms that accept, then fulfill the contract

together. *Syndicated Markets, supra* note 44, at 3786-87. <sup>143</sup> More precisely, the Syndicate Leader can earn Collaborative Profits from cost

savings; it may share these gains with syndicate members via syndication fees. *Id.* 

<sup>&</sup>lt;sup>144</sup> More specifically, agents specify the amount, if any, that the seller's agent will pay the buyer's agent for each consummated transaction. Brokered Markets, *supra* note 44, at 7. This captures an important feature of many real-world Brokered Markets. *See, e.g.*, Elizabeth Weintraub, *How Do Home Buyers' Agents Get Paid*?, THE BALANCE, June 20, 2019, https://www.thebalance.com/how-do-buyer-s-agents-get-paid-1798872.

<sup>&</sup>lt;sup>145</sup> When a firm grows its network, its clients gain access to more potential counterparties, which makes them more likely to consummate transactions and at more favorable prices. Potential clients consider the size of a firm's network when choosing whether to patronize it. Firms only earn profits when their clients successfully consummate transactions. Brokered Markets, *supra* note 44, at 6-8. <sup>146</sup> *Cf. Syndicated Markets, supra* note 44, at 3786-87; Brokered Markets, *supra* note 44, at 6-7.

#### B. The Collusion-Maximizing Outcome

Under the Collusion-Maximizing Outcome, all firms offer the buyer a collusively high price (the monopoly price, for example).<sup>147</sup> The net effect is that the firms split supra-competitive profits among themselves. In addition, all firms collaborate, and thus earn Collaborative Profits.<sup>148</sup> This result is quite similar to observed behavior when firms successfully collude under the Classical Model's Collusion-Maximizing Outcome.

However, under the Collaborative Industry Model, firms can sustain collusion under more circumstances—and thus can earn significantly higher profits—than they can under the Classical Model. The intuition behind this result is that the potential to earn Collaborative Profits makes firms interdependent in a way that they are not under the Classical Model. Firms have a new way to punish a "Price Deviator" that undercuts a collusive arrangement: By refusing to transact with the Price Deviator, they can deny it Collaborative Profits. This threat, which can be extremely powerful, helps deter deviations.<sup>149</sup> As a result, firms can maintain collusive pricing arrangements in many more circumstances than the Classical Model predicts.<sup>150</sup>

To better understand why it is easier to sustain collusion under the Collaborative Industry Model than under the Classical Model, consider the choices that a firm faces in each model. In both models, the key question is the relative attractiveness of deviating as compared to colluding each period; when deviating becomes more attractive than colluding, the industry falls into competition.

Under the Classical Model, each firm chooses between:

(1) deviating by cutting its price—thereby growing its market share for one period, but resigning itself to zero future profits, or

<sup>&</sup>lt;sup>147</sup> Faced with identical offers, buyers randomly distribute their purchases across the industry. *Syndicated Markets, supra* note 44, at 3791-96; Brokered Markets, *supra* note 44, at 19.

<sup>&</sup>lt;sup>148</sup> See Syndicated Markets, supra note 44, at 3791-96; Brokered Markets, supra note 44, at 19.

<sup>&</sup>lt;sup>149</sup> We explain why this threat is in each firm's interest, and thus is credible, in Part IV.C, *infra*.

<sup>&</sup>lt;sup>150</sup> More precisely, there are many instances in which the highest price supported by a subgame perfect Nash Equilibrium in the Collaborative Industries Model is strictly higher than the highest price supported by a Nash Equilibrium in the Classical Model.

(2) colluding by offering the supra-competitive price thereby earning a fraction of monopoly profits for many consecutive periods.

But in the Collaborative Industry Model, a firm chooses between:

(1) deviating by cutting its price—thereby growing its market share for one period, *but losing Collaborative Profits that period*<sup>151</sup> and resigning itself to zero future profits, or

(2) colluding by offering the supra-competitive price thereby earning a fraction of monopoly profits, *and also earning Collaborative Profits*, for many consecutive periods.

The opportunity to earn Collaborative Profits means that a firm in a Collaborative Industry always finds colluding relatively more attractive than the Classical Model contemplates. Thus, collusion is easier to sustain in Collaborative Industries.

Further recall that, under the Classical Model, once the monopoly price becomes unsustainable, firms revert to pure, cutthroat competition. That is not the case in Collaborative Industries. In both models, the benefits of deviating depend, in part, on the size of the gap between the competitive price and the collusive price;<sup>152</sup> the magnitude of Collaborative Profits generally does not. Therefore, for a sufficiently low collusive price, a Price Deviator will immediately lose more Collaborative Profits than it can gain from growing its market share. Thus, at an appropriately chosen supra-competitive collusive price, firms always find colluding more profitable than deviating, even in the short run. This effect persists no matter how diffuse the industry becomes. For example, under the Brokered Markets Model, the Collusion-

<sup>&</sup>lt;sup>151</sup> In the Collaborative Industry Model, growing market share may be immediately unprofitable. For example, in the Syndicated Market Model, a Price Deviator will be forced to produce alone, which may generate negative profits inperiod—a worse outcome than continued collusion. *Syndicated Markets, supra* note 44, at 3801. This is not true in the Classical Model.

<sup>&</sup>lt;sup>152</sup> A deviating firm's profits are given by [profit per sale] \* [number of sales]. The profit per sale equals revenue per sale (i.e., price paid by buyer) minus production cost per sale. To attract new business, the firm must offer a price that is less than the collusive price that other firms are charging. Thus, the collusive price limits the profits that a Price Deviator can earn.

Maximizing Outcome always supports supra-competitive pricing, no matter how many firms enter the market.<sup>153</sup>

Worse, in some instances inter-firm collaboration becomes more important as industry concentration declines, enabling firms to collude at *higher* prices.<sup>154</sup> This is the exact opposite of what the Classical Model predicts.

The Syndicated Markets Model illustrates this dynamic well. Figure 2, below shows the highest sustainable collusive price under the Syndicated Markets Model at varying levels of market concentration.<sup>155</sup> As in Figure 1, the competitive price is 1 and the monopoly price is 25.<sup>156</sup>

## FIGURE 2: HIGHEST SUSTAINABLE PRICE UNDER SYNDICATED MARKET MODEL AS A FUNCTION OF MARKET CONCENTRATION



Market Concentration

When market concentration is high—i.e., there are relatively few firms in the market—then firms can collude at the monopoly price. This set of outcomes is depicted in Figure 2 as the flat bar to the right of the "half pipe" shape, which shows a highest sustainable

<sup>&</sup>lt;sup>153</sup> More specifically, sellers' agents charge monopoly prices each period. The price that buyers' agents charge depends on several parameters. *See* Brokered Markets, *supra* note 44, at 10-11.

<sup>&</sup>lt;sup>154</sup> Syndicated Markets, supra note 44, at 3791. Consumers' willingness to pay means the same monopoly price cap will apply as in the Classical Model.

<sup>&</sup>lt;sup>155</sup> A variant of this diagram appears in *Syndicated Markets*. *Id*.

<sup>&</sup>lt;sup>156</sup> The production cost is  $s^2/m$ , where *s* is the amount produced and *m* is the capacity deployed. Firms value \$1 in one period at \$0.75 now. Firms' total combined capacity is 1. Buyer wishes to purchase 1 unit and its reservation price is 25.

price of 25. This collusion resembles the collusion predicted by the Classical Model; it is enforceable chiefly via the threat of future price competition. However, as Figure 2 illustrates, this bar extends further to the left than it does in the Classical Model. This corresponds to maximal collusion under circumstances that—according to the Classical Model—render collusion impossible.

When market concentration drops below a specified threshold, firms cannot maintain collusion at the monopoly price. But, unlike in the Classical Model, firms do not revert to pure competition; firms can still collude at a supra-competitive price below the monopoly price. The highest sustainable price continues to drop as market concentration decreases. This is depicted in Figure 2 as the right half of the "half-pipe" shape.

As market concentration continues to fall, each firm's capacity declines.<sup>157</sup> That makes producing alone, without a syndicate, more expensive and thus unpalatable. Firms thus become increasingly reliant on syndication, and therefore on each other. When market concentration drops low enough, the threat of refusing to join a Price Deviator's syndicate enables firms to enforce collusion at higher prices. At this point, the highest sustainable price begins creeping upward again.<sup>158</sup> This appears in Figure 2 as the left half of the "half-pipe" shape.

This dynamic—reduced firm capacity increasing the gains from syndication, thereby enabling collusion at higher prices continues until firms are again able to collude at the monopoly price. At that point, the highest sustainable price levels out; this is the flat bar showing a price of 25 to the left of the half-pipe in Figure 2.

In the Syndicated Market Model, firms have the least ability to collude at an intermediate level of market concentration.<sup>159</sup> However, even at their most constrained, firms may still be able to collude at a price far above the competitive price. For example, in Figure 2, firms can always sustain a collusive price of at least 15.<sup>160</sup> This is significantly less than the monopoly price (25)—but it is closer to the monopoly price than it is to the competitive price (1).<sup>161</sup>

<sup>&</sup>lt;sup>157</sup> Assuming identical firms and fixed total industry capacity, increasing the number of firms reduces each firm's capacity. *See* note 175, *infra*.

<sup>&</sup>lt;sup>158</sup> Syndicated Markets, supra note 44, at 3789-91.

<sup>&</sup>lt;sup>159</sup> Id.

<sup>&</sup>lt;sup>160</sup> More precisely, 14.93.

<sup>&</sup>lt;sup>161</sup> To be clear, we are not suggesting that prices in real-world syndicated industries are generally set at fifteen times their competitive levels.

#### C. Why Rivals Shun Price Deviators and the Implications

The preceding Subpart demonstrates how refusing to work with Price Deviators plays a central role in supporting the Collusion-Maximizing Outcome. It is worthwhile to briefly explain why such refusals are in each rival firm's interest. Suppose that a Price Deviator, after lowering its price and growing its market share, makes a Defector Offer to another firm (a "Prospect"), thereby inviting the Prospect to collaborate with it. What are the consequences to the Prospect of accepting or rejecting, respectively?

*Acceptance.* If a Prospect accepts a Defector Offer, then it immediately earns whatever profit the Defector Offer provides it. But in the future, other firms will punish the Prospect as harshly as they can, driving its future profits to zero<sup>162</sup>—the worst possible equilibrium outcome for any firm.<sup>163</sup>

*Rejection.* If a Prospect rejects a Defector offer, then it forgoes any immediate profits that would accompany that deal. But if all Prospects reject their Defector Offers, future play shifts to "Collusive Punishment."<sup>164</sup> Under Collusive Punishment, firms once again offer consumers a collusive price each period,<sup>165</sup> which creates positive, supra-competitive profits for the industry.<sup>166</sup>

These profits are not divided equally; different firms earn different amounts of profit. Firms allocate profits throughout the

<sup>&</sup>lt;sup>162</sup> This can be done in a number of ways: For instance (as in the Classical Model), all firms could offer consumers the competitive price each period, thus providing all firms zero future profits. Alternatively, play could shift to a Collusive Punishment phase that punishes the Prospect, guaranteeing it zero future profits, much in the same way that Collusive Punishment guarantees that a Price Deviator receives zero future profits. *Syndicated Markets, supra* note 44, at 3793-96.

This raises the question of whether it is in other firms' interests to continue to punish the Prospect going forward. It is, because any firm that fails to punish the Prospect in the prescribed way will itself be punished instead. *Id*.

<sup>&</sup>lt;sup>163</sup> We assume a firm can always earn zero profits by earning zero revenues and incurring zero costs. More specifically, it can offer a price that no consumer would accept and then refuse to enter any collaborative transactions with other firms. Therefore, in any Nash Equilibrium, no firm can have negative expected profits. *See id.* at 3791.

<sup>&</sup>lt;sup>164</sup> We refer to Collusive Punishment as a singular result. More precisely, it captures a range of outcomes, depending on the nature of the Defector Offers that the Price Deviator made. *See id.* at 3793-94.

<sup>&</sup>lt;sup>165</sup> This price may be lower than the collusive price offered before the Price Deviator emerged. *Id.* 

<sup>&</sup>lt;sup>166</sup> Collusive Punishment is a Nash Equilibrium, and thus can be sustained over time. The possibility of future collusive punishment phases mean that any firm's most attractive defection is Lone Deviation; the collusive price is chosen so that this is not a profitable deviation. *See id.* at 3796-98.
industry by changing the price and other terms of inter-firm transactions. Prospects that rejected attractive Defector Offers are rewarded via inter-firm transactions with favorable terms.<sup>167</sup> For example, in the Syndicated Markets Model, firms that reject attractive syndication offers from a Price Deviator receive attractive syndication offers from their grateful rivals in subsequent periods.<sup>168</sup>

Moreover, Prospects that reject more attractive Defector Offers receive greater profits.<sup>169</sup> This allocation scheme makes it harder for Price Deviators to recruit Prospects; the more that the Price Deviator offers a Prospect to transact with it, the more the other firms offer the Prospect *not* to do so.<sup>170</sup> When executed correctly, this guarantees that rational Prospects always reject any offer that the Price Deviator is willing to make.<sup>171</sup>

A corollary of this result is that the most profitable potential defection available to any firm is to undercut the collusive price and resign itself to isolation ("Lone Deviation"). Thus, the attractiveness of Lone Deviation relative to continued collusion determines whether firms can sustain collusion. The more important that transactions with other firms are—and thus the larger the gap between the cost of lone production and the competitive price—the easier it is for the industry to sustain collusion. But even under market parameters that make collusion difficult, a Collaborative Industry can still sustain supra-competitive prices.<sup>172</sup>

### D. Key Implications

There are four key takeaways from the Collaborative Industry Model. First, collaborative interactions facilitate collusion.

<sup>&</sup>lt;sup>167</sup> The industry wants to maximize Prospects' incentives to reject Defector Offers, which means maximizing the future profits of Prospects that reject attractive Defector Offers. (Prospects need no further inducement to reject unattractive Defector Offers.) No firm can have a negative expected profit in any Nash Equilibrium. *See* footnote 163, *supra*. Accordingly, the Nash Equilibrium that maximizes Prospects' incentives to reject Defector Offers assigns all future industry profits to those Prospects that reject attractive Defector Offers, and zero profits to all other firms.

<sup>&</sup>lt;sup>168</sup> Syndicated Markets, supra note 44, at 3793-94.

<sup>&</sup>lt;sup>169</sup> See id.

<sup>&</sup>lt;sup>170</sup> A Price Deviator could make a Prospect such a rich offer that the Prospect will earn more profit from accepting than from rejecting. However, paying the Prospect so much is not profitable for the Price Deviator; it would be better off operating on its own. Thus, the Price Deviator will not be willing to make such a rich offer. *See id.* 

<sup>&</sup>lt;sup>171</sup> This approach requires that firms value the future above a minimal level. In particular, the combined value of receiving \$1 in every future period must be at least as large as the value of receiving \$1 immediately. *See id.* at 3790.

<sup>&</sup>lt;sup>172</sup> See notes 151-156, *supra*, and accompanying text.

This is because firms in Collaborative Industries are more interdependent than are firms in more classical markets, which gives an industry more ways to punish a firm that undercuts collusion. This added ability to punish makes collusion feasible in more situations than it is under the Classical Model.

Second, reducing market concentration will not eliminate collusion. Firms' collaborative interactions enable them to maintain supra-competitive pricing, even as market concentration drops to zero. For example, in the Brokered Markets Model, reducing market concentration makes collusion more difficult, which causes prices to decline.<sup>173</sup> However, unlike in the Classical Model, firms can maintain supra-competitive pricing no matter how low market concentration becomes; prices need never approach competitive levels.<sup>174</sup>

Moreover, if interactions between firms become increasingly important when firms are smaller, reducing market concentration can actually facilitate collusion and raise prices.<sup>175</sup> Conversely, under the right circumstances, mergers between competitors may reduce collusion.<sup>176</sup> The Syndicated Markets Model illustrates these dynamics well: When markets are unconcentrated, firms are smaller and thus have less capacity relative to consumer demand. As a result, firms gain more from forming syndicates.<sup>177</sup> Conversely, other firms' threat of refusing to join a Price Deviator's syndicate becomes increasingly powerful. When market concentration becomes low enough, this threat becomes powerful enough to support collusion at the monopoly price.<sup>178</sup>

This result is particularly noteworthy because, as noted previously, it violates the Concentration Principle, which is foundational to antitrust law and theory. In the Classical Model, once market concentration drops low enough, firms cannot maintain

<sup>&</sup>lt;sup>173</sup> Brokered Markets, *supra* note 41, at 11.

<sup>&</sup>lt;sup>174</sup> Id.

<sup>&</sup>lt;sup>175</sup> To isolate the effect of industry concentration, this analysis holds total industry capacity constant as the number of firms in the industry changes. If all firms are the same size, firm size must shrink as industry concentration falls. In our *Syndicated Markets* companion paper, we also consider the case in which firms are added to the industry while firm size is held constant. This causes industry capacity to increase as industry concentration falls. In that scenario, reducing concentration also reduces the highest sustainable price, but not to the competitive level. Industry profits always exceed competitive levels, and may increase as market concentration decreases. *Syndicated Markets, supra* note 44, at 3815-17. <sup>176</sup> Agencies and courts should marshal appropriate skepticism when firms raise such self-serving arguments.

<sup>&</sup>lt;sup>177</sup> *Id.* at 3786.

<sup>&</sup>lt;sup>178</sup> Id. at 3791.

any type of collusion. Antitrust law similarly assumes that more concentrated markets are more susceptible to collusion, and that firms in unconcentrated markets will find collusion difficult or impossible. The Collaborative Industry Model suggests that the conventional wisdom is fundamentally incomplete.

Third, increasing firms' capacity may lower market prices and total firm profits. Antitrust models generally predict the opposite dynamic: Greater capacity makes production less costly. In other contexts, these cost savings generally translate into increased profits for firms.

To understand why increasing capacity in Collaborative Industries can hurt firms, consider its two separate effects:

- 1. Increasing capacity lowers production costs. Lowering costs, while holding revenues constant, increases profits. This effect raises firm profits, just as it does in the Classical Model.
- 2. Increasing capacity can reduce firms' interdependence, which in turn reduces firms' ability to collude. This makes collusion more difficult, pushing prices—and therefore revenues—downward. This effect lowers firm profits.

The second effect can be more powerful than the first. For instance, in the Syndicated Markets Model, increasing firms' capacity lowers the highest sustainable collusive price more than it lowers the cost of production.<sup>179</sup> Firms' revenues therefore fall faster than their costs. The net effect is a reduction in both market price and total firm profits.<sup>180</sup>

Increasing capacity lowers prices in the Brokered Markets Model in a similar way.<sup>181</sup> Again, the key constraint on collusive

<sup>&</sup>lt;sup>179</sup> Increased capacity reduces the cost of completing the project alone. That reduces the advantages of syndicate production relative to lone production, which weakens colluding firms' threat to not join a Price Deviator's syndicate. That makes deviating more attractive, which puts downward pressure on the collusive price. *Id.* at 3799-3800.

<sup>&</sup>lt;sup>180</sup> Id.

<sup>&</sup>lt;sup>181</sup> In the Brokered Markets Model, capacity refers to the volume of buyers and sellers that a firm can service, as compared to its cost of taking on a new buyer or seller. Brokered Markets, *supra* note 44, at 6. As in the Syndicated Markets Model, increases in capacity either have no effect on the highest sustainable collusive price or reduce it. *Id.* at 10-11.

pricing is an ostracized firm's ability to generate profits. Ostracism is less costly for a firm with greater capacity.<sup>182</sup>

Finally, market entry may not reduce collusion. Worse, it can raise the highest sustainable collusive price, increasing both market prices and firm profits.<sup>183</sup> This is another surprising result that runs contrary to antitrust conventional wisdom. In the Classical Model, increasing the number of firms makes collusion more difficult. Antitrust law takes the same approach; the presence of new entrants, or even the possibility of new entrants, is believed to reduce the chance of collusion.<sup>184</sup>

To see why new entrants can raise prices, consider the Syndicated Markets Model. A new firm entering the market can have two possible effects:<sup>185</sup> First, the new entrant may become a Price Deviator; this possibility would make it more difficult to maintain the collusive price. However, the industry can use interfirm transactions to deter any other firms from joining a Price Deviator's syndicate, thereby forcing a Price Deviator to fulfill the contract on its own. But for some entrants—small ones, for example—fulfilling the contract alone will not be profitable.<sup>186</sup> Accordingly, the entrant will never be a Price Deviator, and this possibility thus will not affect the Collusion-Maximizing Outcome.<sup>187</sup>

 $<sup>^{182}</sup>$  At the extreme, a firm with enough capacity to take on all buyers and sellers as clients can earn immediate profits by undercutting collusive pricing: Its network will encompass the entire market, and ostracism by rivals will have no effect. (To isolate and emphasize the potentially collusion-fostering effects of inter-firm collaboration, the Brokered Markets Model assumes that buyers and sellers can coordinate their behavior as a group.) *Id.* at 9-10. However, undercutting the collusive pricing ends future collusion, costing the firm long-term profits from sharing in that collusion; this is the same tradeoff that the Classical Model captures, and collusion can only be maintained in the same instances as the Classical Model predicts.

<sup>&</sup>lt;sup>183</sup> Obviously, it does not raise the buyer's reservation price. So, if the collusive price is the monopoly price, a new entrant will not raise the market price further—though it will increase total firm profits.

<sup>&</sup>lt;sup>184</sup> See, e.g., Matsushita v. Zenith Radio Corp., 475 U.S. 574, 591 n.15 (1986) ("Respondents offer no reason to suppose that entry into the relevant market is especially difficult, yet, without barriers to entry, it would presumably be impossible to maintain supracompetitive prices for an extended time.").

<sup>&</sup>lt;sup>185</sup> There is also a third possible effect: The new firm may make it easier for a Price Deviator to form a syndicate, which would make it more difficult to maintain collusion. *Syndicated Markets, supra* note 44, at 3801. However, as described in Part IV.C, *supra*, the Collusive Punishment system prevents this.

<sup>&</sup>lt;sup>186</sup> More specifically, to cover its costs, the firm would need to charge a price that is higher than the collusive price, and thus it cannot undercut the collusive market price. *Id*.

<sup>&</sup>lt;sup>187</sup> Id.

Second, the new entrant brings with it additional productive capacity, which reduces the cost of efficient joint production. This makes collusion more profitable, and therefore more attractive relative to deviating. This effect always applies, and so entry by a small enough entrant raises the highest sustainable collusive price.<sup>188</sup>

# V. REAL-WORLD VALIDITY OF THE COLLABORATIVE INDUSTRY MODEL

When deciding how to incorporate the findings of the Collaborative Industries Model into policy, one should consider how well the model reflects the real world. We first approach this question from the perspective of theory. In particular, we examine the assumptions upon which our models are built, then explain why real-world markets' violations of those assumptions do not threaten our key results. We next consider the same question from an empirical perspective. Preliminary empirical testing of the model has been favorable; we summarize these results. We also discuss a number of observed behaviors that are difficult to reconcile with the Classical Model, but are consistent with the Collaborative Industries Model.

## A. Theoretical Considerations: Assumptions Revisited

As an initial matter, because the Collaborative Industries Model closely mirrors the Classical Model, it should be expected to retain the Classical Model's strengths—strengths that have made the Classical Model and its progeny so influential in antitrust law and theory for decades. In particular, the Collaborative Industries Model is a repeated game, in which firms interact over a long time horizon. This enables a much larger set of equilibrium behaviors than are possible under single-shot games.

At the same time, the Collaborative Industries Model builds on existing models. In many models, firms only interact with each other as competitors, and only through one channel of competition, such as product pricing or quantity of production. In the Collaborative Industries Model—and in reality—firms interact in more complex ways. They are competitors in some fields and

<sup>&</sup>lt;sup>188</sup> *Id.* This same logic demonstrates why the highest sustainable price will also increase if new entrants (of any size) cannot contract with clients directly, but can only join syndicates. In such circumstances, the first and second effects described above will again not apply after entry, but the third will, increasing the highest sustainable collusive price.

collaborators in others.<sup>189</sup> There are personal and business relationships that tie them together in a complicated mesh.<sup>190</sup> These other channels of interaction and influence give firms ways to punish each other besides slashing prices, which can be as costly to the punish-or as it is to the punish-ee.<sup>191</sup> They also give firms ways to reward each other as well.

The Collaborative Industries Model gives firms a relatively large menu of possible actions each period. Combined with a long time horizon, this geometrically magnifies the breadth and complexity of firms' interactions. The net effect is a much richer environment that more closely resembles the real world—and thus captures important features of the real world that the Classical Model does not.

Nonetheless, the Collaborative Industries Model, like all economic models, makes a number of assumptions. When deciding how much weight to give a model's conclusions, it is important to consider how far the real world diverges from the model's assumptions, as well as the implications of the model's assumptions not being met. To these topics we now turn.

## 1. Heterogeneous Capacity

For simplicity, the preceding analysis assumes that all firms have the same capacity—i.e., that they are the same size. But, in reality, this is clearly not the case: Real-world firms vary in size,

<sup>&</sup>lt;sup>189</sup> For example, Netflix relies on Amazon Web Services to deliver its content, all while competing against Amazon Prime Video for subscribers. *Netflix & Amazon Kinesis Data Streams Case Study* (2017), https://aws.amazon.com/solutions/casestudies/netflix-kinesis-data-

streams/#:~:text=Netflix%20uses%20Amazon%20Web%20Services,100%2C00 0%20server%20instances%20on%20AWS; Dan Moskowitz, *Who Are Netflix's Main Competitors?*, INVESTOPEDIA, May 16, 2020, https://www.investopedia.com/articles/markets/051215/who-are-netflixs-maincompetitors-nflx.asp#:~:text=channels'%20subscription%20services.-

<sup>,</sup>Amazon,production%20of%20its%20original%20content. See also, e.g., Herbert Hovenkamp & Erik Hovenkamp, *The Viability of Antitrust Price Squeeze Claims*, 50 ARIZ. L. REV. 967 (2008) (analyzing antitrust issues pertaining to vertically integrated firms selling essential inputs to firms they compete with downstream).

<sup>&</sup>lt;sup>190</sup> As Adam Smith said, "People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices." Adam Smith, *An Inquiry Into the Nature and Causes of the Wealth of Nations*, in GREAT BOOKS OF THE WESTERN WORLD 55 (R. Hutchins & M. Adler eds., 1952).

<sup>&</sup>lt;sup>191</sup> Dean Harvey, Anticompetitive Social Norms as Antitrust Violations, 94 CALIF.L. REV. 769 (2006)

from tiny one-person operations to massive corporations with tens of thousands of employees.

In our companion papers, we formally analyze the implications of firms having varying sizes.<sup>192</sup> In general, the basic picture remains the same. More specifically, our key results hold: Collaborative interactions among firms again facilitate collusion. Reducing market concentration does not eliminate collusion, and can even facilitate it. Increasing firms' capacity may lower market prices and total firm profits. Small entrants can raise market prices. Each of these results follows for the same reasons described previously.<sup>193</sup> Thus, this assumption is not a problem for our analysis.

However, we note that the specifics of how things change when firms vary in size can be a bit complicated. Compared to an industry with equal-sized firms, an industry with firms of different sizes may be able to maintain collusion at either a higher or a lower price, depending on how productive capacity is distributed across different firms.<sup>194</sup> Moreover, the profit that each firm earns depends on that firm's capacity, as well as the capacities of other firms; firms with higher capacities earn more profits.<sup>195</sup>

2. Information

The Collaborative Industry Model assumes that firms have, and act upon, two key pieces of information. First, it assumes that firms know the capacities of other firms in their industry.<sup>196</sup> This assumption seems broadly unproblematic. Firms often know a great

<sup>&</sup>lt;sup>192</sup> Syndicated Markets, supra note 44, at 3801.

<sup>&</sup>lt;sup>193</sup> See id.

<sup>&</sup>lt;sup>194</sup> *Id.* Adding a small amount of heterogeneity always increases the highest sustainable price. In other words, if firms in an industry are all the same size, then some firms get a little larger while others get a little smaller, the highest sustainable price will increase (or, if it is already the monopoly price, stay the same). *Id.* 

<sup>&</sup>lt;sup>195</sup> This is because, at equilibrium, the most tempting deviation is for a firm to undercut the collusive price and fulfill the contract alone. *See id.* That option is most attractive to the firms with the most capacity, as fulfilling the contract alone is least costly for them. Thus, to maintain the highest collusive price possible, larger firms must receive more profits. On the other hand, firms that are too small to profitably fulfill the contract alone will not be tempted to undercut the collusive price, so there is no need to allocate them any supra-competitive profits. *Id.* These results fit with conversations we have had with players in a number of syndicated industries regarding how profits are split among firms. For example, while we have not seen precise data, the conventional wisdom is that large underwriters earn the lion's share of profits from underwriting IPOs, while smaller firms make much less.

<sup>&</sup>lt;sup>196</sup> See also id.

deal about the competitive environment in which they operate, including basic information about their main competitors, such as their rough size.

Of course, firms' information and estimates may be imperfect. Firms' uncertainty will limit their ability to alight upon the Collusion-Maximizing Outcome. For example, firms may collude at a price below that of the Collusion-Maximizing Outcome, simply because they do not realize the industry is capable of maintaining collusion at a higher price. But these effects are at the margin. Small errors in estimating firms' capacities are unlikely to prevent collusion altogether, or even to put a significant damper on it. Thus, this assumption is of little concern.

Second, the Collaborative Industry Model assumes that all firms know the key terms of the offers that firms make each other, including those that are rejected.<sup>197</sup> This assumption is significant because the Collusion-Maximizing Outcome rewards firms for refusing to transact with Price Deviators, and the size of the reward varies based on how tempting the rejected transaction was.<sup>198</sup> If other firms cannot observe rejected offers, they cannot calibrate rewards based on them. This reduces firms' ability to isolate Price Deviators, which in turn makes it more difficult to sustain collusion.

We note that, even if firms do not see full offers, participants in an industry generally have some sense of goings-on in that industry. If firms have an imperfect guess as to the terms of rejected offers, they can still offer (imperfectly calibrated) rewards to firms that reject attractive offers from Price Deviators. Worse-tailored rewards will have less of a deterrent effect on would-be deviators, but they will still have a deterrent effect.<sup>199</sup> This will translate into a reduction in the maximum sustainable collusive price, but it will not lower prices to their competitive level. Accordingly, this assumption seems broadly unproblematic.

# 3. Transaction Costs

Like the Classical Model, the Collaborative Industry Model assumes away transaction costs. This is a common modeling assumption that is never strictly true in reality.<sup>200</sup>

<sup>&</sup>lt;sup>197</sup> See also id. at 3794.

<sup>&</sup>lt;sup>198</sup> See id.

<sup>&</sup>lt;sup>199</sup> See generally John William Hatfield et al., Collusion with Hidden Syndication Recruiting (draft on file with authors).

<sup>&</sup>lt;sup>200</sup> See Barry et al., supra note 81, at 1163; see also R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1, 15-16 (1960) (exploring the results that would follow if this assumption were literally true in reality); Jordan M. Barry & John

The main way that this assumption impacts our models is that it makes collaborative inter-firm transactions easier. In reality, putting together such deals requires time and money. The "no transaction cost" assumption eliminates these transactional roadblocks. This makes our idealized collaborative transactions more attractive prospects, and thus more likely to occur, than realworld ones.<sup>201</sup> The net effect is likely to increase the theoretical importance of collaborative interactions among firms. This in turn increases the power of other firms' threats of ostracizing a deviator.

However, this difference is a matter of degree, and not of kind. The main results of our model continue to apply under a world in which collaborative transactions between firms become less frequent and less important. Thus, the "no transaction cost" assumption seems relatively untroubling.

## 4. Perfect Individual Rationality

Finally, our models assume that firms are perfectly rational and single-mindedly pursue their self-interest. This leads to some results that some may find hard to swallow. For example, the Collusion-Maximizing Outcome calls for firms to respond to certain transgressions with extremely long-lasting punishments—i.e., shunning a Price Deviator forever. Some may question whether firms will really be willing to stick with this course of action when the time comes. Similarly, the Collusion-Maximizing Outcome also calls for a specific allocation of profits when firms reject a Price Deviator's overtures.<sup>202</sup> One might question whether real-world firms will execute this plan exactly.

William Hatfield, *Pills and Partisans: Understanding Takeover Defenses*, 160 U. PA. L. REV. 633 (2012) (exploring same assumption in different context).

<sup>&</sup>lt;sup>201</sup> For example, our Syndicated Markets Model assumes that, at equilibrium, every firm in a syndicated industry participates in every syndicate; this generally does not happen in practice. *Syndicated Markets, supra* note 44, at 3789-90.

Transaction costs could be roughly constant for each new member brought into a syndicate, while the production cost savings from adding a new firm likely decline as total syndicate capacity increases. If so, once a certain number of firms join the syndicate, the transaction costs of recruiting an additional syndicate member will outweigh the efficiency gains from doing so. At this point, the syndicate leader will stop recruiting firms, presumably smaller firms. We might also expect smaller firms to earn smaller profits than larger firms. *See id.* at 3799; Part V.A.1, *supra*.

<sup>&</sup>lt;sup>202</sup> See Syndicated Markets, supra note 44, at 3792-98.

As a preliminary matter, these types of problems are common in repeated game economic models.<sup>203</sup> In particular, the Classical Model suffers from the same issue, and to an even greater extent: The Classical Model relies heavily on a Grim Trigger which guarantees that no firm earns any profits, ever—to discourage deviations from the prescribed strategy. In contrast, firms in Collaborative Industries can generally deny a Price Deviator any profits while still earning profits themselves.<sup>204</sup> Thus, any critique of the Collaborative Industry Model on this basis applies with even greater force to the Classical Model.<sup>205</sup>

More importantly, however, this critique is conceptually misguided. There may be situations in which the precise strategies contemplated by our models cannot be executed and, in these situations, firms may be less able to maintain collusion than our models predict. This is unsurprising and largely unproblematic. Generalized formal models like ours and the Classical Model are not intended to provide hard and fast rules on when collusion will happen—one would not want to conclude, based on the Classical Model, that an industry with seven firms is susceptible to collusion, but that an industry with eight is not.<sup>206</sup> The value of generalized formal models is that they can delineate the broad contours of what may happen and how those contours change as different parameters While firms' imperfect rationality may reduce the fluctuate. Collaborative Industry Model's predictive power with respect to specific scenarios, the model's basic dynamics survive unscathed, as do the policy implications that flow from those dynamics.

<sup>&</sup>lt;sup>203</sup> See, e.g., Ariel Rubinstein & Asher Wolinsky, *Renegotiation-Proof Implementation and Time Preferences*, 82 AM. ECON. REV. 600 (1992) (discussing this concept).

<sup>&</sup>lt;sup>204</sup> They can also maximally punish any Prospect that accepts a Defector Offer at the same time. *See Syndicated Markets, supra* note 44, at 3793; Brokered Markets, *supra* note 44, at 13.

<sup>&</sup>lt;sup>205</sup> This is not to say that the Classical Model has no responses to this attack. For instance, once an industry reaches competitive equilibrium and all firms price at competitive levels, it may be difficult to escape it: So long as one firm prices competitively, the others have no incentive to raise their prices, as they will simply lose volume to the competitively pricing firm. Corralling all firms to change their behavior simultaneously may be challenging, especially since legally enforceable contracts are generally unavailable as a direct tool for cartel assembly.

<sup>&</sup>lt;sup>206</sup> See Maurice E. Stucke, *Behavioral Economics at the Gate: Antitrust in the Twenty-First Century*, 38 LOY. U. CHI. L.J. 513, 552 (2007) ("'[I]t is impossible to specify a threshold figure above which collusion becomes an attractive proposition,' or below which collusion is unlikely.") (quoting RICHARD A. POSNER, ANTITRUST LAW at 70 (2d ed. 2001)).

### B. Empirical Evidence

Direct empirical investigations of our models are still in their initial stages, but they have been supportive so far. Motivated by our work, Cai et al. investigate how industry concentration affected the interest rates (i.e., prices) that banks offered borrowers in the syndicated loan market.<sup>207</sup> Consistent with our theory, they found robust evidence that prices are U-shaped with respect to market concentration; both low and high levels of market concentration were associated with high interest rates.<sup>208</sup> They also record anecdotal evidence of syndication "blacklists" in the syndicated loan market—banks refused to deal with other banks that undermined collusive pricing.<sup>209</sup> This suggests that firms in Collaborative Industries employ the types of punishment strategies that we identify.

Moreover, our theoretical findings offer a new explanation for some important and longstanding empirical findings regarding collusion.<sup>210</sup> Under the Classical Model and many of its intellectual descendants, collusive behavior becomes more likely as industry concentration increases. However, a review of the empirical literature reports that "there is no simple relationship between industry concentration and the likelihood of collusion"<sup>211</sup> and some researchers have found that industries with lower levels of concentration are actually *more* likely to produce cartels.<sup>212</sup> Richard Posner found that a "large proportion [of cartels are] in industries not normally regarded as highly concentrated."<sup>213</sup> Frass and Greer studied cartels that were successfully prosecuted from 1910 to 1972.<sup>214</sup> They found that, for cartels in which the trade industry

<sup>&</sup>lt;sup>207</sup> Cai et al., *supra* note 117.

<sup>&</sup>lt;sup>208</sup> *Id.* at 22-24.

<sup>&</sup>lt;sup>209</sup> *Id.* at 2.

<sup>&</sup>lt;sup>210</sup> There are possible alternative explanations in the literature. *See* Margaret C. Levenstein & Valerie Y. Suslow, *What Determines Cartel Success?*, 44 J. ECON. LIT. 43, 58 n.50 (2006).

<sup>&</sup>lt;sup>211</sup> Id.

<sup>&</sup>lt;sup>212</sup> See Andrew R. Dick, *Identifying Contracts, Combinations and Conspiracies in Restraint of Trade*, 17 MANAGERIAL & DECISION ECON. 203, 212-13 (1996b); *see also* Levenstein & Suslow, *supra* note 210. *But see* George Symeonidis, *In Which Industries Is Collusion More Likely? Evidence from the UK*, 51 J. INDUS. ECON. 45 (2003) (finding that collusion is less likely at both very high and very low levels of concentration).

 <sup>&</sup>lt;sup>213</sup> Richard A. Posner, A Statistical Study of Antitrust Enforcement, 13 J.L. & ECON. 365, 410 (1970); see also Levenstein & Suslow, supra note 210, at 58 n.50.
<sup>214</sup> Arthur G. Frass & Douglas F. Greer, Market Structure & Price Collusion: An Empirical Analysis, 26 J. INDUS. ECON. 21, 34 (1977).

played a role, the average cartel included more than 30 firms.<sup>215</sup> Clabault and Burton looked at ten years of price-fixing prosecutions and found no relationship between an industry's concentration and its likelihood of price-fixing.<sup>216</sup> They also report that, among prosecutions in national industries, approximately 70 percent of defendants came from industries that were not highly concentrated.<sup>217</sup>

There are also well-documented instances in which very unconcentrated industries have produced collusive behavior.<sup>218</sup> Many of these cases pose a challenge for the Classical Model, but are entirely consistent with the Collaborative Industries Model.

For example, as discussed above, the DOJ prosecuted dozens of NASDAQ market makers for collusively pricing NASDAQ stocks.<sup>219</sup> At the time, there were approximately 60 market makers operating on the NASDAQ; these market makers enjoyed "relatively free entry and exit" into individual stocks.<sup>220</sup> Many collusively priced stocks were household names, like Apple Computer, Microsoft, and Intel, and some were quoted by as many as 50 market makers,<sup>221</sup> yet market makers maintained collusive pricing for many years.<sup>222</sup> They were able to do so because the industry is a Brokered Market, in which market makers had ample ability to reward and punish each other for "unprofessionally"<sup>223</sup> or "unethically"<sup>224</sup> violating collusive pricing conventions. The DOJ documented how market participants employed these tools to great Often, simply pointing out offending behavior was effect.<sup>225</sup> sufficient to prompt a correction,<sup>226</sup> but participants were also capable of more forceful responses,<sup>227</sup> including refusing to transact

<sup>&</sup>lt;sup>215</sup> *Id.* (the median was 16; for the full sample, the mean (median) was 16.7 (8)).

<sup>&</sup>lt;sup>216</sup> James M. Clabault & John F. Burton, Jr., Sherman Act Indictments 1955-1965: A Legal and Economic Analysis 135-37 (1966). More precisely, they look at industry structure, which is a broader concept than concentration, but includes it. <sup>217</sup> *Id.* at 136.

<sup>&</sup>lt;sup>218</sup> See also Levenstein & Suslow, supra note 210, at 58 n.50.

<sup>&</sup>lt;sup>219</sup> See Part III.B.2, supra.

<sup>&</sup>lt;sup>220</sup> Christie & Schultz, *supra* note 136, at 1813, 1838.

<sup>&</sup>lt;sup>221</sup> *Id.* at 1813.

<sup>&</sup>lt;sup>222</sup> DOJ NASDAQ Statement, *supra* note 132 at 6.

<sup>&</sup>lt;sup>223</sup> *Id.* at 6-8, 12.

 $<sup>^{224}</sup>$  *Id.* at 6-8.

<sup>&</sup>lt;sup>225</sup> Id. passim.

<sup>&</sup>lt;sup>226</sup> *Id.* at 8-9.

 $<sup>^{227}</sup>$  *Id.* at 9 ("On [some] occasions, traders resorted to more intimidating telephone calls to exact compliance .... Some of the more dramatic examples of these were captured on the audio tapes that were produced by the defendants ...."); *id.* (quoting a market maker's statement that a non-conforming trader should

with deviating firms.<sup>228</sup> The collusive behavior broke down when it was publicized.<sup>229</sup>

Similarly, in *Dahl v. Bain Capital Partners*, plaintiffs alleged that at least fifteen firms, including every major U.S. private equity firm, colluded over a multi-year period.<sup>230</sup> The alleged behavior largely matches that described in the Syndicated Markets Model: Private equity firms made investments in a syndicated manner, known as "club deals,"<sup>231</sup> and they stopped competing and took turns winning bids.<sup>232</sup> Plaintiffs offered evidence that defendants refused to work with outsiders (i.e. potential entrants and spoilers of collusion) who wanted to challenge allegedly collusive deals.

Plaintiffs also argued that firms received compensation for not competing against rivals.<sup>233</sup> This compensation came in the form of lucrative syndication offers, which firms were expected to reciprocate.<sup>234</sup> Plaintiffs provided "numerous examples" of these alleged behaviors.<sup>235</sup> Perhaps most strikingly,

[The firms] monitored compliance through . . . detailed 'scorecards' that listed the deals they worked on, who else

<sup>&</sup>quot;straighten up his [expletive deleted] act and stop being a moron.") (expletive deleted in original).

<sup>&</sup>lt;sup>228</sup> *Id.* at 9-10.

<sup>&</sup>lt;sup>229</sup> Christie & Schultz, *supra* note 135; DOJ NASDAQ Statement, *supra* note 132 at 13-14.

<sup>&</sup>lt;sup>230</sup> Fifth Amended Class Action Complaint for Violations of the Federal Antitrust Laws, Dahl v. Bain Capital Partners LLC, Case No. 1:07-cv-12388-EFH (D. Mass. Oct. 10, 2012) [hereinafter *Dahl* Complaint].

<sup>&</sup>lt;sup>231</sup> *Id.* at 22 ("[Private equity firms] formed joint purchasing clubs . . . , refused to top one another's bids, and divided deals among themselves through a series of *quid pro quo* arrangements."); *id.* at 26 ("Defendants formed clubs in every single large LBO. These clubs would number as many as seven Defendants even when any one Defendant could have profitably purchased the target on its own."). "LBO" is an abbreviation for Leveraged Buyout, a type of transaction. *Id.* at 1.

<sup>&</sup>lt;sup>232</sup> "Defendants would allocate the deals among themselves, such that they each took a turn as the 'winner.'" *Id.* at 29. Plaintiffs documented how executives at multiple firms "admitted that forming clubs suppressed price competition" for target companies. *Id.* at 26. For example, "KKR bragged to its investors in 2005: 'Gone are the days when buy-out firms fought each other with the ferocity of cornered cats to win a deal.'" *Id.* at 25. "Every time a Defendant's club signaled that it had a proprietary deal . . . the other Defendants refused to submit a better offer," even when doing so meant, in the words of one defendant, "we let [another private equity firm] get away with highway robbery." *Id.* at 27, 120.

<sup>&</sup>lt;sup>233</sup> *Id.* at 26, 29-32.

<sup>&</sup>lt;sup>234</sup> They also argued that "in exchange" "for not competing for large LBOs," defendants were "offered an invitation to participate in that LBO" or a future LBO "with its co-conspirators," "as a reward." Id. at 24, 29, 30-32. Firms "invited into a current deal understood that they were required to invite their co-conspirators into a subsequent deal." *Id.* at 30.

<sup>&</sup>lt;sup>235</sup> *Id.* at 30.

was involved in those deals, and the resulting favors that they owed others and that others owed them.

[For example, in one] instance, when Apollo co-founder Leon Black expressed his anger at Goldman Sachs' "lack of reciprocity" for two deals he had invited Goldman Sachs to join, Goldman Sachs' executives reviewed their scorecard and readily agreed that they "truly need[ed] to involve [Apollo] soon in a principal deal."<sup>236</sup>

Academic work by Officer et al. supported plaintiffs' allegations. Over the time period in which plaintiffs alleged collusion, Officer et al. found "that target shareholders receive[d] ... roughly 40% lower premiums, in club deals" than in other private equity transactions.<sup>237</sup> Moreover, they found "little support for benign motivations for club deals."<sup>238</sup>

*Dahl* settled before trial, following seven years of litigation in which plaintiffs overcame "dozens of motions to dismiss and for summary judgment" and defendants produced millions of pages of documents.<sup>239</sup> In total, the fifteen firm defendants paid almost \$600 million.<sup>240</sup> Club deals became less frequent in the wake of *Dahl* and the related DOJ investigation.<sup>241</sup>

Finally, we note that there are studies of specific collaborative practices and industries that support our analysis. For

. . . .

<sup>&</sup>lt;sup>236</sup> *Id.* at 32-33.

<sup>&</sup>lt;sup>237</sup> Officer et al., *supra* note 117.

<sup>&</sup>lt;sup>238</sup> Id. at 214.

<sup>&</sup>lt;sup>239</sup> Supplemental Memorandum of Law in Support of Named Plaintiffs' Motion for Preliminary Approval of Settlements, Including a Settlement with Defendants the Blackstone Group L.P., Kohlberg Kravis Roberts & Co. L.P. and TPG Capital, L.P., Dahl v. Bain Capital Partners, No. 1:07-cv-12388-WGY, 2014 WL 12718975, at 2 (D. Mass. Aug. 7, 2014) [hereinafter *Dahl* Settlement].

<sup>&</sup>lt;sup>240</sup> The exact number was \$590.5 million. *Id.* (listing total payments from all non-Carlyle defendants at \$475.5 million); Thomas Heath, *Carlyle Settles Collusion Case for \$115 Million*, WASH. POST, Aug. 29, 2014, https://www.washingtonpost.com/business/capitalbusiness/carlyle-settles-collusion-case-for-115-million/2014/08/29/06bf9918-2fbe-11e4-bb9b-997ae96fad33 story.html.

<sup>&</sup>lt;sup>241</sup> Jon Fougner, *Antitrust Enforcement in Private Equity: Target, Bidder, and Club Sizes Should Matter*, 2013 YALE J. REG.; Peter Fogel, *Party's Over: Why PE Firms Are No Longer Clubbing*, PITCHBOOK, Apr. 23, 2014, https://pitchbook.com/news/articles/partys-over-why-pe-firms-are-no-longer-clubbing; Alex Lykken, *Why Club Deals Might Be Making a Comeback*, PITCHBOOK, Sept. 28, 2018, https://pitchbook.com/news/articles/why-club-deals-might-be-making-a-comeback ("[C]lub deals are also deemed less competitive, or at least they once were. . . [This] perception[] stuck, which helped push down the frequency of those deals in recent years. [The percentage of club deals] has plunged to only 20% today.").

example, multiple papers have considered research joint ventures. A number of scholars have postulated that such ventures could theoretically foster collusion.<sup>242</sup> Empirical analyses employing different methodologies have also linked such ventures to collusion.<sup>243</sup> For example, Duso et al. found that firms that enter into research joint ventures with non-competitor firms grow their market shares, consistent with the joint research fueling business growth.<sup>244</sup> But when firms conduct research and development jointly with their competitors, their market share shrinks, consistent with collusive behavior.<sup>245</sup> Moreover, this effect increases when a larger proportion of competitors are connected via a network of research joint ventures.<sup>246</sup> These findings support our own: Competitors can use collaborative interactions to help them collude. As collaboration with rivals becomes more important, the scope for collusion increases.

### VI. POLICY IMPLICATIONS

We now turn to five major policy implications of our prior analysis. First, collusion is sustainable under a wider range of circumstances than prior economic models suggest. Second, our models should inform courts and agencies' analyses of two key doctrinal issues: the "plus factors" suggesting implicit agreements among firms and the application of the "rule of reason." Third, our models implicate the ways in which regulators and private plaintiffs select and present cases. Fourth, we discuss how our results should alter the public guidance that agencies issue. Fifth, our analysis suggests two potent tools for fighting collusion in Collaborative

<sup>&</sup>lt;sup>242</sup> See, e.g., Luis Cabral, R&D Cooperation and Product Market Competition, 18 INT'L J. INDUS. ORG. 1033 (2000); Russell Cooper & Thomas Ross, Sustaining Cooperation with Joint Ventures, 25 J.L. ECON. & ORG. 31 (2009); Stephen Martin, R&D Joint Ventures and Tacit Product Market Collusion, 11 EUR. J. POL. ECON. 733 (1995); Kaz Miyagiwa, Collusion and Research Joint Ventures, 57 J. INDUS. ECON. 768 (2009); Evgenia Motchenkova & Olgerd Rus, Research Joint Ventures and Price Collusion: Joint Analysis of the Impact of R&D Subsidies and Antitrust Fines, VU AMSTERDAM RES. MEMO. (2011).

<sup>&</sup>lt;sup>243</sup> See, e.g., Joanne Oxley et al., Arms Race or Détente? How Inter-Firm Alliance Announcements Change the Stock Market Valuation of Rivals, 55 MGMT. SCI. 1321 (2009); Michelle S. Goeree & Eric Helland, Do Research Joint Ventures Serve a Collusive Function?, IEW - Working Papers 448, Inst. for Emp. Res. in Econ. - University of Zurich, revised Jul 2012; see also Sigrid Suetens, Does R&D Cooperation Facilitate Price Collusion? An Experiment, 66 J. ECON. BEHAVIOR & ORG. 822 (2008) (finding, in a laboratory experiment, that R&D cooperation facilitates collusion).

<sup>&</sup>lt;sup>244</sup> Duso et al., *supra* note 105, at 350. <sup>245</sup> *Id* 

 $<sup>^{245}</sup>$  Id.  $^{246}$  Id.

Industries: adjusting market structures and increasing firms' productive capacities.

# A. There Is Greater Scope for Collusion Than Economic Models Conventionally Recognize

One of the main results of our models is that there is far greater scope for collusion in Collaborative Industries than prior economic models have generally recognized. Contra the Concentration Principle, neither low market concentration nor low barriers to entry prevent collusion in Collaborative Industries. Worse, the Concentration Principle can be backwards—in some instances, reducing concentration or entry by small firms can actually facilitate collusion.

These points merit special emphasis because the Concentration Principle and focus on entry are so central to antitrust theory and law.<sup>247</sup> For example, mergers are generally subject to antitrust review by the DOJ and FTC. The agencies' jointly issued Horizontal Merger Guidelines<sup>248</sup> explicitly incorporate both market concentration and entry into their analysis: when market concentration is low enough, mergers are generally exempt from review.<sup>249</sup> When market concentration is above a specified level, horizontal mergers are automatically presumed to have unacceptable anticompetitive effects.<sup>250</sup> Entry plays nearly as prominent a role. The guidelines devote an entire section to the topic,<sup>251</sup> and mergers are generally deemed unproblematic if entry is sufficiently "timely, likely, and sufficient in its magnitude."<sup>252</sup>

The FTC's enforcement decisions clearly illustrate the centrality of concentration and entry to the agency's thinking. From

<sup>&</sup>lt;sup>247</sup> Entrants are so central that they have been referred to as "the superheroes of consumer welfare." Stucke, *supra* note 206, at 563; *cf*. Matsushita v. Zenith Radio Corp., 475 U.S. 574, 591 (1986); Tops Markets Inc. v. Quality Markets, Inc. 142 F.3d 90, 99 (2d Cir. 1998).

<sup>&</sup>lt;sup>248</sup> A horizontal merger is a merger of two firms in the same industry. HMG, *supra* note 5.

<sup>&</sup>lt;sup>249</sup> Id. at 19.

<sup>&</sup>lt;sup>250</sup> More precisely, when markets are moderately or highly concentrated, mergers that increase concentration by a specified threshold "potentially raise significant competitive concerns and often warrant scrutiny." In highly concentrated markets, mergers that increase concentration by a higher threshold are "presumed to be likely to enhance market power." *Id.*; *see also id.* at 2 ("The unifying theme of these Guidelines is that mergers should not be permitted to . . . enhance[e] market power.").

 $<sup>^{251}</sup>$  Id. §9.

<sup>&</sup>lt;sup>252</sup> *Id.* at 28-29.

1996-2005, almost 90% of FTC enforcement actions against horizontal mergers were against mergers that would have left three or fewer competitors in an industry;<sup>253</sup> 98% were against mergers that would have left five or fewer.<sup>254</sup> Similarly, "empirical studies of FTC enforcement confirm the near outcome-determinative effect of easy entry. If entry is not impeded, enforcement action is very unlikely."<sup>255</sup> Courts generally take a similar approach.<sup>256</sup>

To be clear, agencies and courts should consider market concentration and ease of entry. Both are important characteristics of an industry. But in Collaborative Industries, these features alone are insufficient to understand and predict industry dynamics. Our results suggest that Collaborative Industries are particularly susceptible to collusion and thus merit extra scrutiny.

Firms in Collaborative Industries can collude in other ways besides raising prices. We thus see our results as related to a larger line of literature on private ordering—private actors' ability to arrange their affairs in the absence of government. For example, in a prominent article in this area, Lisa Bernstein details how diamond dealers opted out of public courts in favor of an industry-specific system of arbitration.<sup>257</sup> The diamond industry is a Collaborative

<sup>&</sup>lt;sup>253</sup> FTC, Horizontal Merger Investigation Data, Fiscal Years 1996-2005, Jan. 25, 2007, tbl. 4.1, *available at* https://www.ftc.gov/sites/default/files/documents/reports\_annual/horizontal-merger-investigation-data-fiscal-years-1996-%E2%80%93-

<sup>2005/</sup>p035603horizmergerinvestigationdata1996-2005\_0.pdf (512 of 578 enforcement actions). We note that the FTC and DOJ issued new horizontal merger guidelines in 2010 that purport to take a more holistic approach.

<sup>&</sup>lt;sup>254</sup> Id. (567 of 578 enforcement actions); see also Mary Coleman, Compass Lexecon, The FTC and DOJ's Horizontal Guidelines Review Project: What Changes Might Be in Store for Merger Review?, GCP: THE ANTITRUST CHRONICLE, Dec. 2009, available at https://www.ftc.gov/system/files/documents/public comments/2018/08/ftc-

<sup>2018-0053-</sup>d-0015-154990.pdf ("[M]ergers are generally never challenged with post-merger HHIs less than 1,800 or with a change less than 250.9.").

<sup>&</sup>lt;sup>255</sup> Malcolm Coate, An Overview of Transparency at the Federal Trade Commission: Generalities and Innovations in Merger Analysis, GCP: THE ANTITRUST CHRONICLE, Dec. 2009, at 11 (collecting studies).

<sup>&</sup>lt;sup>256</sup> See, e.g., ProMedica Health Sys., Inc. v. FTC, 749 F.3d 559, 568 (6th Cir. 2014); Saint Alphonsus Med. Ctr. v. St. Luke's Health Sys., Ltd., 778 F.3d 775, 788 (9th Cir. 2015); FTC v. Sysco Corp., No. 1:15-cv-00256 (APM), 2015 U.S. Dist. LEXIS 83482 (D.D.C. June 23, 2015); see also Edith Ramirez, Chairwoman, U.S. Federal Trade Commission, The Horizontal Merger Guidelines Five Years Later, Ninth Annual Global Antitrust Enforcement Symposium, Georgetown University Law Center, Washington, DC, Sept. 29, 2015, available at https://www.ftc.gov/system/files/documents/public\_statements/805441/ramirez\_ - georgetown antitrust enforcement symposium 9-29-15 0.pdf.

<sup>-</sup> georgetown\_antitrust\_enforcement\_symposium\_9-29-15\_0.pdf. <sup>257</sup> Lisa Bernstein, *Opting Out of the Legal System: Extralegal Contractual Relations in the Diamond Industry*, 21 J. LEG. STUD. 115 (1992).

Industry that in some ways operates as a Brokered Market;<sup>258</sup> market participants used their interdependence to create an effective dispute resolution system.<sup>259</sup> Others have argued that competitive markets prevent discrimination, obviating the need for civil rights laws.<sup>260</sup> Under this view, "if competitive market forces are allowed to work, the problem of discrimination will be solved by the entry of new firms who will cater to [under-served] markets, wholly without legal compulsion."<sup>261</sup> Yet if firms are interdependent, they can enforce discriminatory norms, and new entrants may not be able to correct this.<sup>262</sup> In short, our models demonstrate that private ordering is a powerful tool that can produce a wide range of outcomes. And like all tools, it can be used for socially beneficial or socially harmful ends.<sup>263</sup>

### **B.** Doctrinal Implications

Our models have implications for several doctrinal questions in antitrust law. We focus on two here: the definition of "agreement" and rational basis review.

1. Agreement

As discussed previously, Section 1 of the Sherman Act forbids agreements in restraint of trade.<sup>264</sup> Such an agreement need not be explicit. At the same time, supra-competitive pricing alone generally does not suffice. Instead, plaintiffs and enforcement officials must demonstrate additional circumstances that suggest an agreement. What "plus factors" sufficiently imply the existence of an agreement is a key question in U.S. antitrust law.

<sup>&</sup>lt;sup>258</sup> *Id.* passim (describing transactions among dealers); *id.* at 20 ("profitability depends largely on a dealer's network of contacts").

<sup>&</sup>lt;sup>259</sup> Id.

<sup>&</sup>lt;sup>260</sup> See Richard A. Epstein, Forbidden Grounds: The Case Against Employment Discrimination Laws (1992).

<sup>&</sup>lt;sup>261</sup> Richard A. Epstein, *The Problem with Antidiscrimination Laws*, Hoover Inst., Apr. 13, 2015, https://www.hoover.org/research/problem-antidiscrimination-laws.

<sup>&</sup>lt;sup>262</sup> Cf. Andrew Koppelman, Richard Epstein's Imperfect Understanding of Antidiscrimination Law, LAW & LIBERTY, Jan. 12, 2016, https://lawliberty.org/forum/richard-epsteins-imperfect-understanding-of-

antidiscrimination-law/ ("[Epstein] left culture out of his model. . . . Economic models should take account of this reality.").

<sup>&</sup>lt;sup>263</sup> See *supra* notes 242-246 and accompanying text.

<sup>&</sup>lt;sup>264</sup> See Part II.A, supra.

Our analysis suggests two broad classes of behavior that should constitute significant plus factors. Both relate to firms' interactions concerning deviations from collusive arrangements. At the outset, we note that firms often will not refer to existing industry practices as collusive. They may decry deviators for violating industry norms, or even ethical or professional standards.<sup>265</sup> Terminology notwithstanding, the key question is the effect of the arrangement—i.e., maintaining supra-competitive prices to the benefit of the industry and the detriment of its counterparties.

The first class of behavior concerns refusals to deal with Price Deviators. Such refusals play a vital role in sustaining collusion; because cooperative interactions are important in Collaborative Industries, refusals to deal can impose heavy costs on Price Deviators. Refusals to deal involve turning down Defector Offers that would be immediately lucrative, and thus are economically irrational absent an underlying common scheme. Courts should thus treat such refusals to deal as evidence of an implicit agreement.<sup>266</sup>

For example, consider W.R. Hambrecht, an investment bank that conducts auction-based IPOs.<sup>267</sup> The standard fee for a midsized IPO in the United States is 7%.<sup>268</sup> W.R. Hambrecht charges roughly half that.<sup>269</sup> Other investment banks have resisted working with W.R. Hambrecht.<sup>270</sup> For instance, Morningstar hired Morgan Stanley to underwrite its IPO.<sup>271</sup> But after Morgan Stanley learned it would have to work with W.R. Hambrecht on the IPO, Morgan Stanley walked away.<sup>272</sup> Allegedly, banks have refused to work with W.R. Hambrecht because its lower fees and use of auctions do not conform to industry norms.<sup>273</sup> If W.R. Hambrecht's competitors are

<sup>&</sup>lt;sup>265</sup> DOJ NASDAQ Statement, *supra* note 132; Brokered Markets, *supra* note 44, at 42.

<sup>&</sup>lt;sup>266</sup> An organized refusal to deal with a price deviator can itself be illegal. *See* GAVIL ET AL., *supra* note 5, at 128-30.

<sup>&</sup>lt;sup>267</sup> Joe Nocera, *Open and Fair: Why Wall St. Hates Auctions*, N.Y. TIMES, Mar. 18, 2006, at C1, https://www.nytimes.com/2006/03/18/business/open-and-fair-why-wall-st-hates-auctions.html.

<sup>&</sup>lt;sup>268</sup> See id.; Jackson, supra note 18.

<sup>&</sup>lt;sup>269</sup> Randall Smith, *Heard on the Street*, WALL ST. J., July 6, 2005, at C1, *available at* http://schwert.ssb.rochester.edu/f423/WSJ050706\_IPO.pdf.

<sup>&</sup>lt;sup>270</sup> Nocera, *supra* note 267.

<sup>&</sup>lt;sup>271</sup> Id.

<sup>&</sup>lt;sup>272</sup> Id.

<sup>&</sup>lt;sup>273</sup> *Id.*; Matthias Hild, *The Google IPO*, Darden Case Study Series UV 3867, at 7-8 (quoting Patrick Byrne, CEO of Overstock.com as saying "I know . . . the kinds of pressures that got brought by Wall Street when we decided to go with Hambrecht.... I had white-shoe Wall Street bankers tell me if you go with

collectively working to punish it for pricing below prevailing levels, that suggests an implicit agreement.

Second, rewarding those firms that punish Price Deviators also plays an important role in sustaining collusion: These rewards help encourage firms to maintain discipline and reject tempting Defector Offers. Moreover, rewarding a rival firm for rejecting Defector Offers is only rational if done pursuant to some underlying arrangement that furthers industry collusion. Our models predict that these rewards come in the form of lucrative inter-firm transactions, and we believe that this prediction seems likely to translate to the real world. Plaintiffs and government agencies should be on the lookout to see whether firms that refuse to work with Price Deviators are rewarded by their peers, either via an increased volume of transactions or via transactions conducted at favorable prices or terms. Courts should recognize this behavior as indicative of an agreement, and treat it as such. Similarly, firms sometimes trumpet their refusals to work with Price Deviators. For example, online real estate broker Redfin charges lower commissions than traditional realtors. Traditional realtors have discouraged their clients from transacting with Redfin clients in a variety of ways,<sup>274</sup> and have even outright refused to pass on Redfin buyers' offers to their clients.<sup>275</sup> One of Redfin's responses was creating a "Hall of Shame"-a website calling out traditional realtors who, against their own clients' interests, engage in acts of

<sup>[</sup>Hambrecht], we will never pick up coverage. Just threatening me."); *cf*. Christine Hurt, *Morningstar's Auction IPO*, THE CONGLOMERATE, May 4, 2005, https://www.theconglomerate.org/2005/05/morningstars\_au.html ("Many have charged that the biggest stumbling block to auction IPOs is the Wall Street machine of investment banks and analysts."). Of course, there are other reasons why W.R. Hambrecht's rivals might not wish to work with it. We make no assertion as to their motivations here.

<sup>&</sup>lt;sup>274</sup> See, e.g., James R. Hagerty, Real-Estate War Traps Consumers In the Middle, WALL St. J., June 17, 2006, available at https://www.wsj.com/articles/SB115049967110282990 (describing how a seller's broker was "initially friendly and helpful" but "refused to show the condo to the couple again and said he would advise his client not to consider any offer they made" when he learned they were using Redfin; the couple "gave up on" buying the condo); Glenn Kelman, Testimony Before the Financial Services Committee of the U.S. House of Representatives, Subcommittee on Housing and Community Opportunity, July 25, 2006, available at https://archivesfinancialservices.house.gov/media/pdf/072506gk.pdf.

<sup>&</sup>lt;sup>275</sup> Kelman, *supra* note 274. According to Redfin's CEO, "[s]ixty-three percent of [its] customers report meddling from other agents," including intimidation, "mak[ing] up grade-school legal mumbo-jumbo to scare [Redfin] clients, and even threats of violence. *Id*.

hostility against Redfin clients.<sup>276</sup> To Redfin's surprise, agents immediately applied to appear there.<sup>277</sup> At first glance, this seems surprising; potential clients and regulators may take a dim view of such behavior, so why draw attention to it?

An agent might seek publicity to inform her peers of her refusal to deal with Redfin agents, in the hope that they will reward her for it.<sup>278</sup> For example, her peers might respond by showing her listings more frequently, or encouraging their clients to accept offers from her clients. Courts should treat such behavior as evidence of an agreement.

Three additional points merit mention.<sup>279</sup> First, the length of time for which firms ostracize Price Deviators and reward faithful Prospects should not be important for antitrust law. Our models contemplate these behaviors continuing indefinitely.<sup>280</sup> That is the optimal strategy to enforce collusion when firms are perfectly rational and have perfect information. But in reality, those conditions will seldom apply. Thus, firms may instead prefer to refuse to deal, or to reward a competitor, for a fixed period of time.<sup>281</sup> Such behaviors will encourage collusion in the same ways that our models envision. True, these behaviors may sustain collusion less effectively than the behaviors our models prescribe, and thus they may produce a collusive outcome that is somewhat worse for firms (and better for society). However, that is merely a difference of degree, not a difference in kind. The policy implications are the same, and the legal treatment should be as well.

<sup>&</sup>lt;sup>276</sup> *Id.*; Glenn Kelman, *The Hall of Shame*, REDFIN.COM, June 19, 2006, https://www.redfin.com/news/the\_hall\_of\_shame/.

<sup>&</sup>lt;sup>277</sup> Kelman, *supra* note 274.

<sup>&</sup>lt;sup>278</sup> Agents may view the posting as an invitation to their peers to follow suit; if so, courts should treat it as evidence of an agreement, as discussed above. *Cf.* United States v. Foley, 598 F.2d 1323 (4th Cir. 1979) (finding realtor's statement, made to a group of realtors, that "he did not care what the others did" but "that his firm was changing its commission rate from six percent to seven percent" followed by group discussion and price changes, could support a jury finding of conspiracy).

<sup>&</sup>lt;sup>279</sup> We also note that, at equilibrium, this behavior would never be observed: as no firm will ever deviate from the collusive price, there is no one to ostracize, and no one to reward for their role in that ostracism. The real world is messier, however, and that works against colluding firms in this instance.

<sup>&</sup>lt;sup>280</sup> See Part IV.B, supra.

<sup>&</sup>lt;sup>281</sup> Such strategies are easier to implement and are less susceptible to certain types of error costs. For example, if other firms mistakenly believe that a firm deviated and that another firm agreed to work with it, the result would be Bertrand Reversion; the entire industry would earn zero profits forever. *See* Edward J. Green & Robert H. Porter, *Noncooperative Collusion Under Imperfect Price Information*, 52 ECONOMETRICA 87 (1984).

Second, commentators continue to debate the extent to which parallel behavior absent a formal agreement should constitute an antitrust violation. One could argue that the behaviors we describe above-boycotting deviators and rewarding those who maintain the boycott—fall into the category of independent parallel behavior and thus should not trigger antitrust liability. In this view, a firm that refuses to deal is only acting rationally, given how other firms will respond to its behavior-i.e., by rewarding it if it refuses to deal, and by punishing it otherwise.<sup>282</sup>

This argument is misguided. Firms that violate the antitrust laws reluctantly nonetheless violate the antitrust laws.<sup>283</sup> Moreover, to excuse a violation because a firm felt pressure is particularly problematic in this context: Each firm that conforms to the collusive pattern and punishes those firms that do not increases the pressure on the other firms in the industry to conform to the collusive pattern. Giving firms a free pass because they faced pressure, when all firms are pressuring each other, encourages more collusive behavior and would extend the scope of independent action too far. Nearly any behavior could be supported as independent, so long as no explicit agreement can be proven. Such a rule would run contrary to existing precedent and unjustifiably enervate antitrust law.<sup>284</sup>

Relatedly, circumstantial evidence viewed as a whole can suggest an agreement even when no individual piece of evidence does on its own.<sup>285</sup> In conducting this analysis, courts should consider that collaborative industries provide additional opportunities for collusion and thus make agreements more likely.

For instance, in Valspar v. Du Pont, plaintiffs argued that titanium dioxide producers illegally agreed to fix prices. Plaintiffs relied on 31 simultaneous industry-wide price increases and circumstantial evidence of agreement.<sup>286</sup> One piece of circumstantial evidence that plaintiffs raised was the fact that

<sup>&</sup>lt;sup>282</sup> If one accepts this argument, an alternative approach would be to prohibit these types of behaviors directly, either via new legislation or by the FTC's authority to prohibit practices that facilitate anticompetitive behavior. See 15 U.S.C. § 45 (2018). We discuss this approach further in Part VI.E.1, infra.

<sup>&</sup>lt;sup>283</sup> GAVIL ET AL., *supra* note 5, at 130.

<sup>&</sup>lt;sup>284</sup> See, e.g., Foley, 598 F.2d 1323; DOJ NASDAQ Statement, supra note 132; cf. Dahl Settlement, supra note 239.

<sup>&</sup>lt;sup>285</sup> See, e.g., Valspar Corp. v. E.I. Du Pont de Nemours & Co., 873 F.3d 185 (3d Cir. 2017); In re Flat Glass Antitrust Litig., 385 F.3d 350, 359 (3d Cir. 2004); In re Baby Food Antitrust Litig., 166 F.3d 112 (3d Cir. 1999). <sup>286</sup> Valspar, 873 F.3d 185.

producers had sold to each other at non-market prices.<sup>287</sup> In affirming the district court's grant of summary judgment for defendants, the Third Circuit majority stated that the size of intercompany sales were insufficient to have a large effect on market share, and thus did not suggest collusion.<sup>288</sup> Our analysis suggests that the Court's view was too narrow. The fact that companies in the industry had collaborative interactions makes collusion, and thus agreement, more likely. This is true even if the parties did not use intercompany sales to allocate market share.

Finally, both courts and commentators have frequently justified antitrust law's requirement of an agreement to restrain trade on the ground that, absent an agreement, courts cannot craft a remedy.<sup>289</sup> We believe that this is overly defeatist. Many collusive practices depend on industry-wide norms, often framed as issues of professionalism or ethics.<sup>290</sup> Such norms are frequently enforced via collaborative interactions among firms.<sup>291</sup> Sometimes these norms are supported with formal rules, such as industry codes of conduct, that authorities can and do target.<sup>292</sup>

But even when enforcement relies solely on industry custom, enforcement agencies can still have an impact; the specter of antitrust enforcement can disrupt established patterns of behavior. The collusive behavior at issue in the NASDAQ market-maker litigation had persisted for many years, but ended shortly after the *New York Times* reported on it.<sup>293</sup> Similarly, private equity club deals declined in the wake of *Dahl* and the related DOJ investigation.<sup>294</sup> Industry norms often rely on everyone abiding by

<sup>&</sup>lt;sup>287</sup> *Id.* at 201-02, 207-08.

<sup>&</sup>lt;sup>288</sup> *Id.* at 201.

<sup>&</sup>lt;sup>289</sup> See, e.g., Clamp-All Corp. v. Cast Iron Soil Pipe Inst., 851 F.2d 478, 484 (1st Cir. 1988); Reserve Supply Corp. v. Owens-Corning Fiberglas Corp., 971 F.2d 37, 50-51 (7th Cir. 1992); Donald F. Turner, *The Definition of Agreement Under the Sherman Act: Conscious Parallelism and Refusals to Deal*, 75 HARV. L. REV. 655 (1962); 6 PHILLIP AREEDA & DONALD F. TURNER, ANTITRUST LAW ¶¶ 1432–33 (1978).

<sup>&</sup>lt;sup>290</sup> See, e.g., DOJ NASDAQ Statement, *supra* note 132; Brokered Markets, *supra* note 44, at 42.

<sup>&</sup>lt;sup>291</sup> See sources cited in note 290, *supra*.

<sup>&</sup>lt;sup>292</sup> See, e.g., DOJ Realtor Statement, *supra* note 12 (discussing how DOJ successfully attacked a trade association rule that enabled realtors to hide their listings from discount brokers).

<sup>&</sup>lt;sup>293</sup> Christie & Schultz, *supra* note 135.

<sup>&</sup>lt;sup>294</sup> See sources cited in note 241, *supra*.

them. Once a norm erodes, it may be difficult for firms to re-establish it. $^{295}$ 

### 2. Rule of Reason Analysis

Some types of conduct, such as price-fixing among competitors, are per se illegal under the Sherman Act.<sup>296</sup> Not all conduct creates such obvious problems for competition, however. Other types of conduct are subjected to a more nuanced test known as the rule of reason.

Recall that the rule of reason contemplates a three-step process: First, plaintiff must show that the challenged conduct has a substantial anticompetitive effect. If successful, defendant must come forward with a procompetitive rationale for the conduct. If defendant does so, then plaintiff can still win by demonstrating that the defendant could reasonably have achieved the same procompetitive results through less anticompetitive means.<sup>297</sup>

The rule of reason is intended to be flexible. It seeks to determine the results of particular conduct, taking into account the specific behavior at issue and the context in which it occurs.<sup>298</sup> To engage in each step of the required three-step inquiry, courts must understand the dynamics of the industry at issue: To know what effects an action will have, anticompetitive or otherwise, one must know how the action affects competitors, customers, and suppliers.

The Collaborative Industries Model can help courts grapple with these questions by illuminating the dynamics among firms in collaborative industries. In particular, courts should be on the lookout for firms using collaborative transactions to enforce collusive practices. Actions that facilitate refusals to deal with rival

<sup>&</sup>lt;sup>295</sup> Of course, firms could come together and make a formal agreement to reestablish the norm, but that agreement could itself trigger antitrust liability. <sup>296</sup> *See, e.g.*, Ohio v. American Express Co., 138 S. Ct. 2274 (2018).

<sup>&</sup>lt;sup>297</sup> *Id.* at 2284.

<sup>&</sup>lt;sup>298</sup> See, e.g., FTC v. Indiana Fed'n of Dentists, 476 U.S. 447, 459 (1986); Nat'l Soc. Professional Engineers v. United States, 435 U.S. 679, 688, 692 (1978) (in applying the rule, Courts should analyze "the facts peculiar to the business, the history of the restraint, and the reasons why it was imposed"); Continental Television, Inc. v. GTE Sylvania Inc., 433 U.S. 36, 49, 97 (1977) ("Under this rule, the factfinder weighs all of the circumstances of a case in deciding whether a restrictive practice should be prohibited as imposing an unreasonable restraint on competition.").

firms—especially rivals that deviate from established industry practice—can have significant anticompetitive effects.<sup>299</sup>

More generally, courts should be cognizant that any measure that increases the potential for collaboration within an industry also increases the potential for collusion in that industry. To be clear, we do not suggest that all collaborative activities should be prohibited, or that they violate the antitrust laws. Collaboration can create benefits for firms and consumers in appropriate instances.<sup>300</sup> But any benefits created should be weighed against the costs of any reduction in competition. The rule of reason framework, which explicitly provides for such a comparison, is well-equipped to accommodate such an inquiry.

## C. Case Selection and Presentation

The Department of Justice has already observed, through long experience, that links between ostensible competitors can facilitate collusion. DOJ guidelines identify horizontal subcontracting within an industry as a potential red flag that invites regulatory scrutiny.<sup>301</sup> Moreover, a number of famous examples of collusion involved industries in which companies in the industry, and their executives, maintained close business and professional ties.<sup>302</sup> For example, in *United States v. Foley*, the Fourth Circuit affirmed the convictions of nine defendants convicted of conspiring to fix real estate commissions in violation of the Sherman Act.<sup>303</sup> Leading industry players attended dinner parties together, and many were close personal friends.<sup>304</sup> Foley himself was President of the Board of Realtors.<sup>305</sup>

<sup>&</sup>lt;sup>299</sup> The realtor trade association rule that the DOJ attacked in 2008 provides a good example of this phenomenon. DOJ Realtor Statement, *supra* note 12.

<sup>&</sup>lt;sup>300</sup> See Polk Bros., Inc. v. Forest City Enters., Inc. 776 F.2d 185, 188 (7th Cir. 1985) (Easterbrook, J.) ("Cooperation is the basis of productivity. It is necessary for people to cooperate in some respects before they may compete in others, and cooperation facilitates efficient production."); notes 242-246, *supra*, and accompanying text.

<sup>&</sup>lt;sup>301</sup> DOJ, IDENTIFYING VIOLATIONS, *supra* note 34, at 3-4.

<sup>&</sup>lt;sup>302</sup> See, e.g., United States v. Foley, 598 F.2d 1323 (4th Cir. 1979); Christopher Rowland, *Investigation of Generic 'Cartel' Expands to 300 Drugs*, WASH. POST, Dec. 9, 2018, https://www.washingtonpost.com/business/economy/investigation-of-generic-cartel-expands-to-300-drugs/2018/12/09/fb900e80-f708-11e8-863c-9e2f864d47e7\_story.html?utm\_term=.af72682bc48e.

<sup>&</sup>lt;sup>303</sup> *Foley*, 598 F.2d 1323.

<sup>&</sup>lt;sup>304</sup> *Id.* at 1332.

<sup>&</sup>lt;sup>305</sup> Id.

But, until now, there has never been a rigorous theory that explained why or how such markets produced these observed results. Previous explanations have generally focused on how greater interactions facilitated communication or built trust among cartel members.<sup>306</sup>

Our models provide a rigorous theoretical explanation for this result, grounded in economic interdependence. Theories matter. Theory determines what circumstances and conduct regulators find troubling, and therefore what circumstances to investigate. Theory also affects how regulators interpret the facts they see, and thus which cases they decide to bring.<sup>307</sup> Better theories enable regulators to more effectively identify markets that might be problematic, analyze those markets, and explain to judges and juries what is happening.<sup>308</sup>

Explaining theories to judges is particularly important. Antitrust cases rarely proceed to trial; if a plaintiff's claim survives past summary judgment, the parties generally settle.<sup>309</sup> At the summary judgment phase, courts regularly consider whether antitrust allegations "make economic sense."<sup>310</sup> When courts decide that allegations do make economic sense, they draw inferences that are favorable to plaintiffs.<sup>311</sup> Otherwise, they grant defendants summary judgment.<sup>312</sup>

Our results can inform how plaintiffs present their cases in court. A key result of our models is that interdependence among

<sup>&</sup>lt;sup>306</sup> See, e.g., Complaint, Connecticut v. Sandoz, Inc., June 10, 2020 (Dist. Conn.) (devoting a section to "The Cozy Nature of the Industry and Opportunities for Collusion"); DOJ, IDENTIFYING VIOLATIONS, *supra* note 34, at 5.

<sup>&</sup>lt;sup>307</sup> WERNER HEISENBERG, PHYSICS AND BEYOND: ENCOUNTERS AND CONVERSATIONS 63 (Ruth Nanda Anshen ed., Arnold J. Pomerans trans., 1971) ("It is the theory which decides what we can observe." (quoting Albert Einstein)). <sup>308</sup> See JOHN MAYNARD KEYNES, THE GENERAL THEORY OF EMPLOYMENT INTEREST AND MONEY 383 (1936) ("[T]he ideas of economists . . . both when they are right and when they are wrong, are more powerful than is commonly understood.. . . Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist.").

<sup>&</sup>lt;sup>309</sup> Douglas H. Ginsburg & Joshua D. Wright, *Antitrust Settlements: The Culture of Consent* at 2, in BILL KOVACIC LIBER AMICORUM (2012), *available at* https://www.ftc.gov/sites/default/files/documents/public\_statements/antitrust-

settlements-culture-consent/130228antitruststlmt.pdf ("[The DOJ's Antitrust] Division resolv[ed] nearly its entire antitrust civil enforcement docket by consent decree from 2004 to present... Since 1995, the FTC has settled 93 percent of its competition cases.").

 <sup>&</sup>lt;sup>310</sup> Matsushita v. Zenith Radio Corp., 475 U.S. 574 (1986)
<sup>311</sup> Id.

 $<sup>^{312}</sup>$  Id.

firms facilitates collusion. Our results provide an intellectual framework that plaintiffs can use to build an argument that particular firms or industries are engaged in collusive behavior. We believe that the intuition underlying our results—when firms are reliant on each other, the threat of refusing to work with a firm that does not conform to industry practice is both powerful and credible—fits many people's intuitions and lived experience. Accordingly, it may prove persuasive against claims that firms do not collude because they bid against each other for business or that the industry is unconcentrated and thus incapable of collusion.<sup>313</sup> In appropriate cases, plaintiffs may wish to emphasize this point in pleadings and in court.

Case selection and presentation affect the landscape of antitrust law. Judges are often friendlier to well-trodden theories than to novel ones. For example, consider *Dahl v. Bain Capital Partners*, the private equity litigation described previously.<sup>314</sup> When plaintiffs presented their theory of industry-wide collusion with respect to club deals, the judge responded with skepticism, stating that he had "never heard or seen anything like it."<sup>315</sup> At a hearing on defendants' motion to dismiss, the judge continued:

I don't know, has there ever been another antitrust case that has been pled this way? . . . I will tell you it doesn't happen too often. . . . This pleading is, at least is rare. And I have to be honest with you, it is causing me an awful lot of problems as how to intellectually grasp it. It is just almost overwhelming.<sup>316</sup>

One way the plaintiffs assuaged the judge's concerns was by referring him to the NASDAQ market maker litigation described earlier<sup>317</sup>—a case that arose because of academic research questioning the pricing of NASDAQ stocks.<sup>318</sup> The judge denied defendants' motion for summary judgment, while simultaneously stating that plaintiffs' relatively novel framing made the question a close one.<sup>319</sup>

<sup>&</sup>lt;sup>313</sup> See, e.g., Hansen, supra note 16; Torstila, supra note 19.

<sup>&</sup>lt;sup>314</sup> Dahl Complaint, supra note 230.

<sup>&</sup>lt;sup>315</sup> Klein v. Bain Capital Partners, LLC, No. 07-12388-EFH, Omnibus Motion Hearing, 2012 WL 8704872, Dec. 18, 2012 (D. Mass.).

<sup>&</sup>lt;sup>316</sup> Id.

<sup>&</sup>lt;sup>317</sup> *Id*.

<sup>&</sup>lt;sup>318</sup> Christie & Schultz, *supra* note 136.

<sup>&</sup>lt;sup>319</sup> Dahl v. Bain Capital Partners, LLC, 937 F. Supp. 2d 119 (D. Mass. 2013) (plaintiffs' framing of their claim "nearly warranted its dismissal").

In other instances, the lack of a clear theory has crippled enforcement efforts. For instance, in 1988 the European Commission imposed fines of more than 13 million ECU on three Italian glass manufacturers.<sup>320</sup> Regulators alleged that the glass manufacturers had engaged in price-fixing behavior, and that they had sustained their collusion via a system of cross-supplying each other.<sup>321</sup> Regulators pointed to a long history of firms soliciting product from their rivals, even though they produced the same product themselves, as evidence to support their price-fixing claim.<sup>322</sup> The European Court of Justice overruled the Commission's decision, largely on the ground that it had not proved that the cross-supply behavior was anticompetitive.<sup>323</sup> The lack of a strong underlying economic theory cost regulators the case.

Similarly, the Horizontal Merger Guidelines provide for different presumptions and levels of scrutiny for proposed mergers of competing firms, depending on the concentration of the industry before and after the proposed merger.<sup>324</sup> Our models suggest that, for Collaborative Industries, more nuance may be required. Low market concentration can sometimes be problematic, and raising market concentration can be beneficial. Similarly, there are instances in which the merger of two maverick firms may facilitate competition: Recall that, under the Collaborative Industries Model, industries use collaborative interactions among firms to isolate price deviators. This can prevent maverick firms from working together to undercut industry collusion. A merger among two such firms can solve this problem and push the industry toward a more competitive outcome.

We caution that agencies should be careful and reasoned and approach each market on a fact-specific basis. Collaborative Industries are not always collusive. Nor should agencies treat Collaborative Industries as fundamentally problematic, to be restructured whenever possible. Syndicated production can offer significant cost efficiencies that may benefit consumers. Similar logic applies with respect to brokered markets; consumers would not benefit if realtors could not show their clients other realtors' listings.

<sup>&</sup>lt;sup>320</sup> Pio Baake et al., *Explaining Cross-Supplies*, 70 J. ECON. 37 (1999); SIV v. Commission, Cases T-68/89, T-77/89, T-78/89 (1st Chamber Mar. 10, 1992).

<sup>&</sup>lt;sup>321</sup> Baake et al., *supra* note 320.

<sup>&</sup>lt;sup>322</sup> *SIV*, *supra* note 320.

<sup>&</sup>lt;sup>323</sup> Baake et al., *supra* note 320.

<sup>&</sup>lt;sup>324</sup> See HMG, supra note 5, at 19 ("Unconcentrated Markets: Mergers resulting in unconcentrated markets are unlikely to have adverse competitive effects and ordinarily require no further analysis.").

Agencies should carefully evaluate how firms are behaving in Collaborative Industries and whether consumers are sharing in the benefits of collaborative production.

At the same time, we wish to make clear that agencies should beware of firms misapplying our arguments. For example, firms proposing to merge may argue that they are part of a Syndicated Market and that, pursuant to our model, increased concentration will result in lower prices. Agencies, as well as judges and juries, should be sure to marshal appropriate skepticism against such self-serving arguments.<sup>325</sup>

## D. Agency Public Guidance

Antitrust regulators issue public guidance, both to help businesses comply with the antitrust laws and to help potential victims of anticompetitive behavior to identify it and take action. Our results have implications for these types of guidance.

For instance, the DOJ and FTC have jointly issued Antitrust Guidelines for Collaborations Among Competitors (the "Collaboration Guidelines").<sup>326</sup> These guidelines are intended to make businesses aware of the agencies' view of the antitrust laws so that they can plan accordingly.<sup>327</sup> The Collaboration Guidelines are important; antitrust lawyers scrutinize them to help them advise their clients on how to structure joint ventures and other transactions.

Yet the Collaboration Guidelines do not fully account for the ways that non-competitive interactions between firms can facilitate collusion. For example, they make no mention of syndicated markets, or similar terms such as subcontracting. They assume that higher market concentration always facilitates collusion, and provide a market share-based safe harbor.<sup>328</sup> They also spend a

<sup>&</sup>lt;sup>325</sup> We note that this happens now with respect to the "failing firm" exception in merger review. Firms often raise it to agencies, yet agencies almost never apply it, as the exception is quite narrow. Ian Conner, Director, Bureau of Competition, Fed'l Trade Comm'n, *On "Failing" Firms — and Miraculous Recoveries*, FTC COMPETITION MATTERS BLOG, May 27, 2020, https://www.ftc.gov/news-events/blogs/competition-matters/2020/05/failing-firms-miraculous-recoveries

<sup>(&</sup>quot;[D]espite many claims . . . , the Bureau rarely finds that the facts support a failing firm argument. . . . [I]f you want the Bureau to accept such an argument in your case, you had better actually be failing, and able to prove it.").

<sup>&</sup>lt;sup>326</sup> COLLABORATION GUIDELINES, *supra* note 34.

<sup>&</sup>lt;sup>327</sup> *Id.* at 2-3.

<sup>&</sup>lt;sup>328</sup> *Id.* at 17-18, 26.

significant amount of time and space discussing the potential procompetitive benefits of collaboration, particularly as they relate to efficiencies of joint production that can lower costs.<sup>329</sup> The more efficiencies that exist, the less suspect that collaboration becomes.<sup>330</sup>

While efficiency gains are important and may justify permitting collaboration by industry competitors, the presence of efficiencies and the potential for anticompetitive behavior are by no means opposing concepts. In our models, firms can collude so effectively *because* collaboration produces efficiency gains.<sup>331</sup> The Collaboration Guidelines should be updated or supplemented to convey the dynamics that govern Collaborative Industries more effectively, and regulators' concerns about such markets.

Relatedly, the DOJ also issues guidance on how to detect "Price Fixing, Bid Rigging, and Market Allocation Schemes."<sup>332</sup> This document is intended to help potential victims of illegal anticompetitive behavior recognize that behavior and respond, including by reporting it to authorities.<sup>333</sup> It includes a list of specified conditions for potential whistleblowers to keep in mind as they consider whether they have seen illegal conduct.<sup>334</sup> The first item singled out for attention is that collusion is more likely to occur when there are few sellers.<sup>335</sup> Our results suggest that this guidance should be more nuanced. For example, in Syndicated Markets, low concentration can be as problematic as high concentration.

The document also states that "Collusion is more likely if the competitors know each other well through social connections, trade associations, legitimate business contacts, or shifting employment from one company to another."<sup>336</sup> We agree with this statement. However, the implicit logic is that closer personal ties make it easier for colluding firms to trust and observe each other; this discourages cheating, which facilitates cartel formation and maintenance. But

<sup>&</sup>lt;sup>329</sup> *Id.* at 3, 6, 23-25.

<sup>&</sup>lt;sup>330</sup> Id.

<sup>&</sup>lt;sup>331</sup> See Part IV.B, supra.

<sup>&</sup>lt;sup>332</sup> DOJ, IDENTIFYING VIOLATIONS, *supra* note 34.

<sup>&</sup>lt;sup>333</sup> *Id.* at 1 ("Many [recent antitrust] prosecutions resulted from information uncovered by members of the general public who reported the information to the Antitrust Division. Working together, we can continue the effort to [stop anticompetitive behavior]... [This document] outlines those conditions and events that indicate anticompetitive collusion so that you might better identify and report suspicious activity.").

 $<sup>^{33\</sup>hat{4}}$  *Id.* at 5.

<sup>&</sup>lt;sup>335</sup> Id.

<sup>&</sup>lt;sup>336</sup> Id.

collaborative relationships between market participants also create opportunities for them to punish and reward each other. As our analysis indicates, these dynamics make Collaborative Industries particularly fertile grounds for collusion. The document should put potential whistleblowers on notice so that they can be on the lookout.

### E. Fighting Collusion in Collaborative Industries

Our analysis demonstrates that low market concentration and low barriers to entry are no guarantee against collusion in Collaborative Industries. Happily, our analysis suggests two other powerful tools that may prove more effective: market structure and firm capacity.

# 1. Market Structure

Market structure has important implications for the likelihood and severity of collusion. Market structures and practices are also malleable; there is more than one way for an industry to operate. For example, consider private equity's use of club deals. In the words of the *Dahl* plaintiffs, "From the 1980s through 2003, club bidding was relatively rare. In stark contrast, during the Conspiratorial Era, Defendants formed clubs in *every single* large LBO."<sup>337</sup> Club deals' prevalence then declined sharply, in part because of *Dahl* and the DOJ investigation, and has since rebounded somewhat.<sup>338</sup>

Changing the ways that firms in an industry interact can limit their ability to punish and reward each other, which reduces their ability to collude. Firms understand this point well. For example, large numbers of brokers and investors have repeatedly (and criminally) reorganized markets in order to rig bids at public property auctions.<sup>339</sup> The participants agree that only one member

<sup>&</sup>lt;sup>337</sup> Dahl Complaint, supra note 230, at 26.

<sup>&</sup>lt;sup>338</sup> See, e.g., Michael Flaherty, *Buyout Firms Find Ways Around Club Deals*, REUTERS, Feb. 20, 2007, https://www.reuters.com/article/us-buyout-syndication/buyout-firms-find-ways-around-club-deals-

idUSN2018372920070220; Alex Lykken, *Why Club Deals Might Be Making a Comeback*, PITCHBOOK, Sept. 28, 2018, https://pitchbook.com/news/articles/why-club-deals-might-be-making-a-comeback.

<sup>&</sup>lt;sup>339</sup> See, e.g., U.S. Dep't of Justice, 25 New York Real Estate Brokers Plead Guilty to Rigging Bids at Queens County Courthouse Foreclosure Auctions, Sept. 23,

of the group will bid at the public auction; compliance is easy to police. Then the group holds a subsequent auction among its members in which the highest bidder gets the property. The winning firm's payment is distributed among the other members of the group, ensuring that all group members profit. Firms could achieve the same result without the second auction, but the second auction makes the bid rigging easier to administer and thus more robust.

For another example of how market structure can influence the potential for collusion, consider IPO underwriting services. U.S. underwriters currently price IPOs through a bookbuilding process.<sup>340</sup> Underwriters collect information from potential investors about how much of a company's stock they would be willing to buy, and at what price.<sup>341</sup> This structure puts great weight on the relationships that each bank has with particular investors, as the bank hopes to find enough willing buyers to purchase all of the stock the issuer wishes to sell in the IPO.<sup>342</sup> The desire to access additional investors can drive banks to form syndicates.

But bookbuilding is not the only way to conduct an IPO. There are alternatives, such as auction mechanisms, that could render syndicates unnecessary.<sup>343</sup> Auction mechanisms have a number of attractive theoretical properties,<sup>344</sup> and issuers in many countries have used them to price and distribute publicly offered securities.<sup>345</sup> Some U.S. companies have used auction mechanisms

<sup>1998,</sup> https://www.justice.gov/archive/atr/public/press\_releases/1998/1961.htm; U.S. Dep't of Justice, Twelve Individuals Plead Guilty to Bid Rigging at Real Estate Foreclosure Auctions at Brooklyn County Courthouse, June 4, 1999, https://www.justice.gov/archive/atr/public/press\_releases/1999/2487.htm; U.S. Dep't of Justice, Prosecuting Collusion and Fraud at Real Estate Foreclosure Auctions, https://www.justice.gov/atr/division-operations/division-update-2016/real-estate-foreclosure-auctions ("More than 100 individuals have been charged since the investigation began.").

<sup>&</sup>lt;sup>340</sup> See, e.g., Corrigan, supra note 23.

<sup>&</sup>lt;sup>341</sup> Hild, *supra* note 273.

<sup>&</sup>lt;sup>342</sup> Id.

<sup>&</sup>lt;sup>343</sup> *Id.* An auctioneer need not have close relationships with all participants; she can simply commence the auction and let the bidders bid.

<sup>&</sup>lt;sup>344</sup> Id.

<sup>&</sup>lt;sup>345</sup> Every Japanese IPO from 1989 until 1997 was conducted via an auction format. When U.S.-style book-building IPOs became available in 1997, they produced less accurate and less predictable pricing than auction IPOs. Book-built IPOs gained an average of 48% on their first day of trading, while auctioned IPOs gained 11.4%, with standard deviations of 102.7% and 15.5%, respectively. *Id.* at 5. France has frequently used auction IPOs, with historical average first-day returns of 6.6% (standard deviation 9.4%), compared to 16.9% (standard deviation 24.5%) for book-building IPOs. *Id.* at 5-6; *see also* Torstila, *supra* note

to go public, most notably Google.<sup>346</sup> Decreased use of bookbuilding could reduce interconnections among underwriters, thereby making collusive behavior more difficult to sustain.<sup>347</sup>

Alternatively, one could also imagine a system that enabled companies to easily go public without an underwriter. This would give companies a stronger alternative to hiring an underwriter, pushing down their reservation prices and limiting the space for collusion among underwriters to raise prices.

Issuers, discontent with the IPO Underwriting Market, have already begun embracing alternative paths to becoming public.<sup>348</sup> The year 2020 has seen record-breaking use of an IPO alternative called a Special Purpose Acquisition Corporation ("SPAC").<sup>349</sup> A SPAC is a publicly traded company with no underlying business; it raises money with the plan of acquiring an existing business, to be identified later.<sup>350</sup> The target is generally a private company; when the target merges into the publicly traded SPAC, it becomes public.<sup>351</sup> Thus, for the target, merging with a SPAC is a way to become public without conducting an IPO.<sup>352</sup> In July and August 2020, companies going public via SPACs raised \$20.5 billion, compared to 17 billion from traditional IPOs.<sup>353</sup>

<sup>346</sup> Hild, *supra* note 273.

. . . .

<sup>19;</sup> Timo Lehmann & Matthias Weber, IPO Underpricing and Aftermarket Price Accuracy: Auctions vs. Bookbuilding in Japan, Swiss Institute of Banking and Finance Working Paper on Finance No. 2021/02, Jan. 6, 2021, *available at* https://econpapers.repec.org/paper/osfsocarx/sa385.htm.

<sup>&</sup>lt;sup>347</sup> A number of commentators have argued that auction mechanisms are superior to bookbuilding and should replace it. *See, e.g.*, Mark Abrahamson et al., *Why Don't U.S. Issuers Demand European Fees for IPOs?*, 66 J. FIN. 2055 (2011). <sup>348</sup> Levine, *supra* note 22.

<sup>&</sup>lt;sup>349</sup> See, e.g., Li, supra note 22; Ciara Linnane, 2020 Is the Year of the SPAC, MARKETWATCH, Sept. 16, 2020, https://www.marketwatch.com/story/2020-isthe-year-of-the-spac-yet-traditional-ipos-offer-better-returns-report-finds-2020-09-04; Michael Klausner et al., A Sober Look at SPACs (2021), https://papers.ssrn.com/sol3/papers.cfm?abstract id=3720919.

<sup>&</sup>lt;sup>350</sup> Levine, *supra* note 22.

<sup>&</sup>lt;sup>351</sup> Id.

<sup>&</sup>lt;sup>352</sup> *Id.* When the SPAC itself goes public, it generally requires an underwriter, but SPAC IPO fees are less than those an ordinary midsize issuer would pay. *Id.* (stating SPAC IPO fees are usually 5.5%, versus 7% for typical mid-sized IPOs). *But cf.* Matt Levine, *Money Stuff*, BLOOMBERG, Feb. 10, 2021 ("SPACs are [a] product that banks love and devote lots of resources to marketing."); Klausner et al., supra note 349 ("We find that costs built into the SPAC structure are subtle, opaque, and far higher than has been previously recognized"). <sup>353</sup> Li, *supra* note 22.

Similarly, in 2018, Spotify went public without a conventional IPO, opting instead for an alternative known as a direct listing.<sup>354</sup> Spotify chose a direct listing because of the pathologies of the "broken" IPO Underwriting Market.<sup>355</sup> Several other high-profile companies, including Slack, Asana, and Palantir, have since followed Spotify's example and conducted their own direct listings.<sup>356</sup> Some commentators have argued that the use of direct listings has already affected the IPO market in important ways.<sup>357</sup>

It is also worth noting that many Collaborative Industries are heavily regulated. Government rules and regulations significantly influence the structure of the IPO Underwriting Market—as well as construction markets, insurance markets, securities markets, and many others. Because the government can change those rules and regulations, it is potentially well-positioned to restructure these markets to help fight improper collusion. Similarly, the government can target particular industry practices that facilitate collusion.<sup>358</sup>

For example, in the context of IPOs or government contracting, regulations might require that companies arrange any syndicates before submitting bids to potential clients. This could

<sup>&</sup>lt;sup>354</sup> See, e.g., Shobhit Seth, *IPO vs. Direct Listing: What's the Difference?*, INVESTOPEDIA, https://www.investopedia.com/investing/difference-between-ipo-and-direct-listing/.

<sup>&</sup>lt;sup>355</sup> See, e.g., Barry McCarthy, *IPOs Are Too Expensive and Cumbersome*, FIN. TIMES, Aug. 7, 2018, *available at* https://www.ft.com/content/60cd1bb8-9970-11e8-88de-49c908b1f264. Before Spotify's direct listing, its CEO Barry McCarthy gave investors five justifications for the direct listing; three were about problematic dynamics in the IPO Underwriting Market. Josh Constine, *Here's Why Spotify Will Go Public Via Direct Listing on April 3rd*, TECHCRUNCH, Mar. 15, 2018, https://techcrunch.com/2018/03/15/spotify-direct-listing-date/.

<sup>&</sup>lt;sup>356</sup> Eric Eldon, Airbnb Nears IPO As Asana and Palantir Land Their Direct Listings, TECHCRUNCH.COM, Oct. 3, 2020. https://techcrunch.com/2020/10/03/airbnb-nears-ipo-as-asana-and-palantir-landtheir-direct-listings/. Airbnb considered a direct listing as well. Theodore Schleifer, Airbnb and Slack Are Considering Untraditional IPOs That Box Out Did,ReCode, Bankers Like Spotify Dec. 10, 2018, https://www.recode.net/2018/12/10/18129880/airbnb-postmates-slack-directlisting-ipo.

<sup>&</sup>lt;sup>357</sup> See, e.g., Matt Levine, *Money Stuff*, BLOOMBERG, Oct. 4, 2019 ("[T]he possibility of the direct listing . . . has opened up the black box of the IPO and made every element subject to negotiation and refinement. If you're trying to disrupt IPOs, that's what you should be thinking about.").

<sup>&</sup>lt;sup>358</sup> Congress can do this directly via legislation; the FTC can also prohibit certain anticompetitive practices. 15 U.S.C. § 45 (2018).

potentially encourage competition between syndicate groups,<sup>359</sup> and might produce better outcomes than ex post syndication.<sup>360</sup> Many other interventions are also possible.<sup>361</sup>

Altering market structure is a versatile and powerful option, and thus a promising technique in the regulatory toolbox. At the same time, the details of an industry matter; market structure interventions generally must be tailored to the specific context. It offers no universal magic bullet.

Nonetheless, a few broad principles seem promising. Firms can only punish or reward what they can detect. Accordingly, making it harder for firms to tell when rivals cut prices is likely to be useful.<sup>362</sup> Making interfirm transactions less visible may also be effective, as it weakens collusive punishment schemes.<sup>363</sup> Similarly, in order to collude, firms must coalesce on the price at which they will collude.<sup>364</sup> Practices and institutions that facilitate this process may also be productive targets for regulators.

Finally, we note that in many instances, regulators are the only actors with both the incentive and ability to alter market structure. Incumbent firms will likely be happy with a market structure that supports collusion. And, in Collaborative Industries, incumbent firms can deploy powerful tools against disruptive entrants. Customers may lack incentive to restructure an industry— a company only conducts one IPO,<sup>365</sup> and most individuals buy few houses in their lifetimes. And while current and future customers collectively have strong incentives, the transaction costs involved

<sup>&</sup>lt;sup>359</sup> This might be particularly helpful in letting small players group up together into a large enough body that can plausibly compete for business.

<sup>&</sup>lt;sup>360</sup> Competition among pre-established syndicates might resemble oligopolistic price competition. Ex-post syndication might enable more efficient production but could produce higher prices. *See* Part IV.B, *supra*.

<sup>&</sup>lt;sup>361</sup> For instance, imagine a regulation that required syndicates, once formed, to stay together for an extended period of time—perhaps a year or two—to encourage inter-syndicate competition.

<sup>&</sup>lt;sup>362</sup> See, e.g., 2020 Realtor Statement, supra note 11.

<sup>&</sup>lt;sup>363</sup> See Part V.A.2, *supra*.

<sup>&</sup>lt;sup>364</sup> The same point applies to collusion on non-price terms.

<sup>&</sup>lt;sup>365</sup> This is not strictly true; a company could conduct multiple IPOs if it were to go private in between them. Still, any given company conducts relatively few IPOs over the course of its lifecycle. There are some sophisticated repeat players involved, such as venture capitalists, private equity firms, and entrepreneurs, but the industry may co-opt them by offering them a share of collusive profits. *See* Corrigan, *supra* note 23.

with organized action may be prohibitive.<sup>366</sup> Thus, regulators occupy a unique and potentially vital role in reshaping market structure.

# 2. Capacity

The interdependence of firms in Collaborative Industries enables them to collude. By the same token, reducing firms' interdependence renders collusion more difficult. When firms have larger productive capacities, they are more capable of performing contracts alone and thus are less dependent on their rivals. Accordingly, increasing firms' capacities is a promising avenue for fighting collusive behavior in Collaborative Industries.<sup>367</sup>

A policy of increasing firms' capacity would likely have to be implemented on an industry-by-industry basis, as specific policy measures are likely to be of help only in particular industries. For example, in the context of equity underwriting, policymakers could expand the pool of investors who are allowed to purchase securities in an IPO.<sup>368</sup>

However, as discussed previously in Subpart E, in many Collaborative Industries, regulation helps shape the market, which suggests that policy changes could be an effective lever for increasing capacity. One possibility might be to reconsider some of the regulatory provisions that single out small businesses for especially favorable treatment.<sup>369</sup> Small businesses may not be able to complete production in-house, and thus might be dependent on other firms in ways that larger firms might not. Smaller firms may thus be more likely to go along with collusive industry pricing.

<sup>&</sup>lt;sup>366</sup> MANCUR OLSON, THE LOGIC OF COLLECTIVE ACTION; PUBLIC GOODS AND THE THEORY OF GROUPS (1971). Also, certain collective action among customers could itself be an antitrust law violation.

<sup>&</sup>lt;sup>367</sup> This analysis assumes that collaborative dynamics are fostering collusion in the industry in question. In contrast, if a monopolist is using its market power to engage in anticompetitive behavior, increasing the monopolist's capacity will presumably be ineffective or counterproductive.

<sup>&</sup>lt;sup>368</sup> Similarly, regulated investment entities such as insurance companies could be permitted to hold more publicly traded equities in their portfolios. Of course, there are countervailing (and potentially persuasive) reasons why one might not want to pursue such policies. Our analysis simply suggests one new reason in favor of doing so.

<sup>&</sup>lt;sup>369</sup> See, e.g., Mirit Eyal-Cohen, Down-Sizing the Little Guy Myth in Legal Definitions, 98 IOWA L. REV. 1041 (2013); Mirit Eyal-Cohen, Why Is Small Business the Chief Business of Congress, 43 RUTGERS L.J. 1 (2012); Jordan M. Barry & Victor Fleischer, Tax and the Boundaries of the Firm.
Our results also suggest that, contrary to conventional economic wisdom, easy entry may not prevent collusion in Collaborative Industries.<sup>370</sup> Entry seems least likely to help reduce collusion when new entrants are small. This is because small firms may be more dependent on transactions with other firms than their larger rivals.<sup>371</sup> A Collaborative Industry with fewer, larger firms can sometimes be less susceptible to collusion than one with a greater number of smaller ones.<sup>372</sup>

Similarly, removing barriers to entry in Collaborative Industries may not reduce collusion. Further, barriers to entry may discourage the smallest new entrants, and pose less of an obstacle to firms with greater scale. Under conventional economic theory, this is deeply problematic.<sup>373</sup> But in Collaborative Industries, the picture is murkier: The smallest entrants are the least likely to hinder collusion; restricting the market to fewer competitors with larger market shares can sometimes encourage competition.<sup>374</sup>

## VII. CONCLUSION

In this Article, we analyze the operation of Collaborative Industries through formal models. Our analysis yields surprising and far-reaching insights for competition policy. In particular, firms' non-competitive interactions have major implications for their ability to collude. As a result, there is far greater scope for collusion than economic models conventionally recognize. The dynamics we identify can help regulators and private parties look for collusion, identify it, prove it, and respond.

Furthermore, many of our findings run directly counter to classical antitrust intuitions: Reducing market concentration does not prevent collusion, and may even facilitate it. Easy entry does

<sup>&</sup>lt;sup>370</sup> In some instances, entry can actually facilitate collusion. See notes 183-188, *supra*, and accompanying text.

<sup>&</sup>lt;sup>371</sup> It is also worth noting that entry lowers the cost of production. This is socially beneficial. Thus, entry by small firms could still produce net gains for society even if it fosters anticompetitive pricing; firms could gain more than their customers lose. However, to the extent that society has a choice between encouraging a larger number of small entrants and a smaller number of larger ones, our results favor the latter in certain circumstances.

<sup>&</sup>lt;sup>372</sup> One way in which the law can create barriers to entry is by imposing compliance burdens. These requirements often feature economies of scale that favor medium-sized and large firms over smaller upstarts. Our analysis places these requirements in a better light than they are usually perceived.

<sup>&</sup>lt;sup>373</sup> See sources cited in footnotes 59-60 and 247, *supra*, and accompanying text. <sup>374</sup> See footnotes 183-188, *supra*, and accompanying text.

not prevent collusion, but barriers to entry can undermine it. Increasing firms' capacity can hurt firms and benefit consumers.

The law directly shapes the structure of many Collaborative Industries, including finance, real estate, and construction. Our results show how, by changing market structure, policymakers can alter firms' incentives and achieve pro-consumer results that they cannot achieve by adjusting the level of market concentration. Similar benefits are possible through policy interventions that increase firms' capacities. Our work thus underscores policymakers' need to understand the dynamics of Collaborative Industries if they wish to oversee these industries effectively.