The Case Against Surge Pricing

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Surge pricing—using data and algorithms to raise prices in response to unexpected increases in demand—has spread across the economy in recent years, from Amazon and Disney World to commuter highways and, of course, Uber, which is infamous for surge pricing rides. Companies claim that surge pricing equilibrates supply and demand, but that is impossible, at least in the short run when demand unexpectedly outstrips supply. What surge pricing really does is to ration existing supply based on ability to pay. That is both distributively unjust and potentially inefficient. It should also be considered a violation of the antitrust laws because it magnifies the harm to consumers of the shortage and concomitant harm to competition associated with a surge in demand relative to supply. As such, surge pricing is similar to price fixing, which, when used by firms that have already been tacitly colluding, magnifies the harm to consumers associated with the demise of competition in the market in which the firms are colluding. Courts should therefore rule surge pricing per se illegal under the antitrust laws, just as they do price fixing today.

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TABLE OF CONTENTS

INTRODUCTION 823
II. WELFARE EFFECTS AND ANTITRUST CONSEQUENCES 828
A. SURGE PRICING AND ITS SPREAD 828
B. WELFARE EFFECTS 831
C. ANTITRUST LIABILITY 838
1. The Existence of Anticompetitive Conduct and Monopoly Power 838
2. A Proposed Test 841
D. OBJECTIONS BASED ON INNOVATION AND RISK 842
E. MORE ON HOW DEMAND SURGES 844
F. DISTINGUISHING SURGE PRICING FROM DYNAMIC PRICING 848
III. ADDRESSING COUNTERARGUMENTS 851
A. SURGE PRICING SIGNALS 852
B. SURGE PRICING INVOLVES NO WAITING 859
C. SURGE PRICING ALLOCATES 864
D. SURGE PRICING IS INEVITABLE 867
E. THE COMING ALTERNATIVES TO SELLING OUT 869
IV. BROADER APPLICABILITY 870
A. INTRAMARKET RESALE (INCLUDING SECURITIES AND COMMODITIES TRADING) AND PRICE GOUGING 870
1. Intramarket Resale 870
2. Price Gouging 874
B. BEYOND ALGORITHMIC PRICING 875
1. Toward a Blanket Ban on All Surge Pricing, Including Non-Algorithmic Surge Pricing 875
2. Implications for Theories of Securities and Commodities Trading 876
3. Accounting for Risk 878
CONCLUSION 881

INTRODUCTION

It was on New Year's Day in 2012 that Americans first became aware of the spread of algorithmic pricing. Uber charged revelers many times the regular fare for rides home, triggering a backlash on social media.[1] The $27 ride that went for $135 was not some computer glitch, it turned out, but, as Uber explained, the result of a policy designed to equilibrate supply and demand.[2] When demand for rides surges unexpectedly, argued Uber, there may be too few Uber drivers in the area to satisfy it.[3] To coax them into entering the market, Uber must offer drivers more money, and to do that Uber must charge higher prices to riders.[4] That is ultimately good for riders, argued Uber, because it ensures that sufficient numbers of drivers will enter the area to get everyone a ride home, and fast.[5]

The trouble with this story, researchers later found, was that the high prices Uber charges in response to unexpected surges in demand often fail to induce more drivers to enter the market, but Uber still charges the higher prices to riders anyway.[6] Herein lies an important lesson about algorithmic pricing: It allows prices to change much more quickly than production—which for the most part remains a brick-and-mortar affair—can react. When Uber experiences a surge in demand, the company's pricing algorithms respond immediately to raise prices for rides that are already in the area. This happens long before additional drivers are able to enter the area, if they enter at all.[7]

The mismatch between the speed of price and the speed of production in the information age is leading to harm not just to Uber riders but to consumers across the economy, as surge pricing, which is the use of algorithms to accelerate the process of raising prices in response to unexpected surges in demand, has spread far beyond rideshare to everything from Disney World tickets to highway tolls.[8] It should also lead to antitrust liability because efforts to deepen the mismatch between price and output speeds are fundamentally anticompetitive.

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1. Nick Bilton, *Disruptions: Taxi Supply and Demand, Priced by the Mile*, N.Y. TIMES: BITS (Jan. 8, 2012, 3:05 PM), https://bits.blogs.nytimes.com/2012/01/08/disruptions-taxi-supply-and-demand-priced-by-the-mile [https://perma.cc/3PWL-WATH].

2. *Id.*; *see* Mike Murphy, *Uber Got Two Economics PhDs to Explain How Supply and Demand Works*, QUARTZ (Sept. 17, 2015), https://qz.com/505031/uber-got-two-economics-phds-to-explain-how-supply-and-demand-works [https://perma.cc/4XGZ-7G36].

3. Murphy, *supra* note 2.

4. *Id.*

5. *Id.*

6. Le Chen, Alan Mislove & Christo Wilson, *Peeking Beneath the Hood of Uber*, 2015 IMC'15 PROC. 2015 ACM CONF. ON INTERNET MEASUREMENT CONF. 495, 505.

7. Murphy, *supra* note 2.

8. *See, e.g.*, S. K., *Disney Discovers Peak Pricing*, ECONOMIST (Feb. 29, 2016), https://www.economist.com/free-exchange/2016/02/29/disney-discovers-peak-pricing [https://perma.cc/UP8A-3XWM]; Bart Jansen, *'Dynamic Tolls': How Highways Can Charge $40 for Driving Just 10 Miles*, USA TODAY (Dec. 8, 2017, 11:52 AM ET), https://www.usatoday.com/story/news/2017/12/07/states-governments-increasingly-turn-tolls-manage-highway-traffic-jams/930900001 [https://perma.cc/7EMN-X9QA].

An unexpected surge in demand creates a shortage because firms choose the number of units they will produce to match demand at the market price. When the surge hits, many more prospective buyers show up willing to buy at the market price than the firm has units available to sell to them. It would be great if the solution were for the firm simply to produce more units to satisfy the excess demand, as Uber hopes will happen when the company raises rideshare prices to draw more drivers into the area.[9] But production takes time: minutes in the case of rides on New Year's Eve and weeks in the case of a pandemic-induced run on webcams that must be manufactured in China and then shipped in containers across the deep blue sea.[10] The shortage will therefore not disappear as soon as it strikes, but rather endure in the short term until additional output makes its way to market.

During the shortage period, the firm will have the power to raise prices because it is the ability of supply to increase in response to a surge in demand that normally puts downward pressure on prices.[11] In a competitive market, a firm cannot raise prices because competitors have output handy that they can sell, at a lower price, to the firm's customers. But when a firm faces an unexpected surge in demand, competition halts temporarily, because firms cannot adjust output instantaneously. Until competitors can ramp up production, firms do not need to worry that if they raise prices competitors will have output handy that they can sell at lower prices to the firm's customers.

Surge pricing is anticompetitive because it undermines a technological status quo that once limited the ability of firms to exploit the market power created by unexpected surges in demand. Because firms once could not recall advertisements that had been printed and distributed, reprint all their menus, or cross the prices off the sides of all their packaging much more quickly than they could ramp up their output in response to an unexpected surge in demand, firms were stuck continuing to charge competitive prices even after a demand surge had given them the power to raise prices.[12] Indeed, firms often did not even know that they faced a demand surge until it was all over, as they lacked up-to-date information on how quickly their products were selling out in far-flung retail outposts.[13] The algorithms that enable surge pricing eliminate these

9. *See* Murphy, *supra* note 2. Throughout this Article, I assume, for the sake of simplicity of exposition, that every buyer in a market buys only one unit of a good. However, my arguments apply with equal force to the more general case in which buyers may buy more than one unit of a good.

10. *See* Le Chen et al., *supra* note 6, at 500; Rachel Lerman, *The Hunt for a Work-From-Home Webcam: A Story of Broken Supply Chains, 'Sold-Out' Messages and Refreshing Online Carts*, WASH. POST (Mar. 21, 2020, 6:00 AM ET), https://www.washingtonpost.com/technology/2020/05/21/webcam-backorder-coronavirus-pandemic.

11. *See* David J. Teece & Mary Coleman, *The Meaning of Monopoly: Antitrust Analysis in High-Technology Industries*, 43 ANTITRUST BULL. 801, 825 (1998).

12. *See* ALAN S. BLINDER, ELIE R.D. CANETTIE, DAVID E. LEBOW & JEREMY B. RUDD, ASKING ABOUT PRICES: A NEW APPROACH TO UNDERSTANDING PRICE STICKINESS 231–36 (1998).

13. Emek Basker, *Raising the Barcode Scanner: Technology and Productivity in the Retail Sector*, 4 AM. ECON. J.: APPLIED ECON. 1, 2 (2012).

obstacles, and the resulting price rigidity, allowing firms to jack up prices as soon as demand spikes. In this way, the tendency of competitive pricing to carry over from the pre-surge period into the surge period is made to disappear.[14]

To be sure, surge pricing is not directly anticompetitive in the way of most practices prohibited by the antitrust laws. A firm's decision to stop selling an essential input to a competitor, for example, directly increases the firm's power to raise prices by depriving the competitor of the ability to remain in the market, which is why such terminations can violate Section 2 of the Sherman Act.[15] By contrast, surge pricing does not drive competitors from markets or otherwise disrupt supply, and therefore does not directly create power over price. The unexpected surge in demand and coincident output shortage create that power instead.[16] But surge pricing does prevent the relatively competitive prices of the pre-shortage period from carrying over into the shortage period, which is to say that it limits the effects of competition and enables exercise of the market power created by an unexpected demand surge.

Antitrust sometimes treats action that removes limits on the ability of a firm to exploit an independent collapse in competition as anticompetitive conduct. One example is antitrust's per se rule against price fixing.[17] Price fixing can directly harm competition. If a group of firms engaged in competition with each other agree to fix a high price, the agreement itself may be said to eliminate competition in the market. As a result of the agreement, the parties will no longer behave like competitors. But often firms that agree to fix prices were not initially in genuine competition with each other, but instead were already colluding tacitly.[18] The firms use their price-fixing agreement only to make explicit the terms of their preexisting cooperation.[19] In this case, price fixing cannot be said directly to eliminate competition. Instead, like surge pricing, price fixing, in this context, can be said only to exploit a competitive vacuum that, thanks to antitrust immunity for tacit collusion, is, like the power created by shortage, not itself a violation of the antitrust laws.[20]

Firms might, for example, tacitly collude to charge a price of ten dollars for their goods, even though the power created by their collusive behavior would allow them profitably to charge a price of fifteen dollars instead. Entering into an explicit agreement to charge fifteen dollars enables them to choose the highest price made possible by their preexisting collusive behavior, but does not involve any additional direct harm to competition, since they are already colluding

14. *See id.*

15. HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE 384 (6th ed. 2020).

16. *See* Teece & Coleman, *supra* note 11, at 814.

17. HOVENKAMP, *supra* note 15, at 330–31.

18. RICHARD A. POSNER, ANTITRUST LAW 52–53 (2d ed. 2001).

19. HOVENKAMP, *supra* note 15, at 211.

20. *Id.* at 210–13.

tacitly to raise prices.[21] Like surge pricing, the agreement serves only to enable the parties more fully to exploit power created by another source: in this case preexisting—and entirely legal—"tacit collusion."[22] The courts would nevertheless consider this example of price fixing to be anticompetitive conduct, and indeed would prohibit it, just as courts should consider surge pricing to be anticompetitive conduct as well, even though surge pricing is not directly anticompetitive.[23]

The antitrust laws do not usually prohibit anticompetitive conduct per se, but instead usually only prohibit anticompetitive conduct when undertaken by firms having substantial market power.[24] Many firms that engage in surge pricing do not have substantial market power, however, and therefore would not be subject to an antitrust rule against surge pricing that included a market power requirement. But the courts do sometimes prohibit anticompetitive conduct on a per se basis (i.e., without requiring proof of market power).[25] The courts should make surge pricing illegal per se because surge pricing always harms consumers. Surge pricing always harms consumers because firms choose their prices to cover their costs, inclusive of the return that investors demand for having invested in the firm.[26] It follows that, when a firm raises its prices in response to an unexpected demand surge, the firm raises its prices above its costs, and so redistributes wealth from consumers to the firm unnecessarily. But pricing that extract wealth from consumers unnecessarily is the very definition of consumer harm in antitrust.[27]

When a firm raises prices during the shortage created by a surge in demand, the firm in effect rations access to the good based on the ability of consumers to pay high prices for it. A prohibition on surge pricing would force firms instead to ration access based on the principle of antecedence—that is, a rule of first come, first served. Historically, rationing with high prices has been more efficient than rationing based on antecedence because waiting on physical lines is a waste of time.[28] The internet has almost completely eliminated that cost, however. Today, any firm that chooses not to raise prices in the face of a demand surge does not need to make customers actually wait in line in order to ration

21. POSNER, *supra* note 18, at 52–53.

22. *Id.* at 55.

23. *See* United States v. Socony-Vacuum Oil Co., 310 U.S. 150, 223 (1940) ("Under the Sherman Act a combination formed for the purpose and with the effect of raising, depressing, fixing, pegging, or stabilizing the price of a commodity in interstate or foreign commerce is illegal per se." (emphasis omitted)).

24. Timothy J. Muris, *The New Rule of Reason*, 57 ANTITRUST L.J. 859, 861 (1988).

25. Broad. Music, Inc. v. Columbia Broad. Sys., Inc., 441 U.S. 1, 19–20 (1979) (citing United States v. U.S. Gypsum Co., 438 U.S. 422, 441 n.6).

26. *See* HAL R. VARIAN, INTERMEDIATE MICROECONOMICS: A MODERN APPROACH 334–35 (7th ed. 2006) (discussing the firm's profit maximization problem). Firms do not choose their prices to cover their costs in the special case of ruinous competition.

27. John B. Kirkwood & Robert H. Lande, *The Fundamental Goal of Antitrust: Protecting Consumers, Not Increasing Efficiency*, 84 NOTRE DAME L. REV. 191, 192 (2008).

28. *See* Robert T. Deacon & Jon Sonstelie, *Rationing by Waiting and the Value of Time: Results from a Natural Experiment*, 93 J. POL. ECON. 627, 627–28 (1985).

based on antecedence. If the firm sells online, customers can log in to the firm's website and either buy or receive a "sold out" notice instantaneously. At worst, the cost to the customer is the time required to select an item and click through to the checkout screen only to find that someone else has clicked "submit" a split-second faster. If the firm sells in brick-and-mortar stores, it can implement an online reservation system that similarly eliminates the cost of waiting in lines, as many big retailers have already done under the "in-store pickup" moniker.[29] The queue is now efficient.

Surge pricing belongs to a broader category of algorithmic pricing practices, known as dynamic pricing, that have in common the goal of adjusting price in response to unexpected changes in demand.[30] Surge pricing reacts to unexpected increases in demand. Other forms of dynamic pricing react to unexpected decreases in demand. Somewhat confusingly, these other forms of dynamic pricing may nevertheless increase prices, just as surge pricing does. These other forms of dynamic pricing do not necessarily violate the antitrust laws, however, because, unlike price increases that respond to demand surges, price increases that respond to demand shortfalls do not always harm consumers. If a firm must recoup high upfront costs, for example, the firm may need to raise prices in response to the lower sales volumes created by a demand shortfall in order to extract more revenue per unit and thereby to continue to cover those costs. By contrast, what makes surge pricing always harmful to consumers is that a surge in demand does not force down sales volumes, and so the firm can cover its costs without jacking up its prices, rendering any price increase purely a matter of redistribution of wealth from consumers to the firm.

The fact that other forms of dynamic pricing may lead to price increases that do not harm consumers suggests that a per se rule against surge pricing might be difficult to enforce, as it might be difficult to distinguish between good and bad price increases. That is unlikely to be true, however, because courts can reliably identify surge pricing using a test having four factors, each of which can be established through discovery of a defendant's pricing and inventory systems. A firm that, (1) uses algorithms to set its prices, (2) experiences a surge in demand, (3) increases its prices in response to that surge, and (4) does so faster than the firm increases its supply, must be engaged in surge pricing. Other forms of dynamic pricing respond to declines in demand, rather than surges in demand, and so would be screened out by the second factor.

Proof of the existence of these factors should be sufficient to make out a claim for per se liability for surge pricing under Section 2 of the Sherman Act.[31] The first factor—the requirement that pricing be algorithmic—establishes the

29. Bob Tedeschi, *Retailer's Shortcut from Desktop to Store*, N.Y. TIMES (Sept. 24, 2007), https://www.nytimes.com/2007/09/24/technology/24ecom.html [https://perma.cc/MW9Y-KM8L].

30. Tim Walker, *How Much . . . ? The Rise of Dynamic and Personalised Pricing*, GUARDIAN (Dec. 2, 2017, 12:49 EST), http://www.theguardian.com/global/2017/nov/20/dynamic-personalised-pricing [https://perma.cc/H3D8-PNQW].

31. *See* 15 U.S.C. § 2 (2018).

existence of the anticompetitive conduct that the firm increased its pricing speed relative to its production speed and in this way reduced the period during which competitive pricing persists into the demand surge. Existence of the other three factors establishes that the firm harmed consumers by increasing price during a shortage period created by a surge in demand. Liability should follow immediately under Section 2 because Section 2 prohibits anticompetitive and consumer-harmful conduct by individual firms.[32] This would be the first per se prohibition to be recognized under Section 2, as all existing Section 2 prohibitions require proof of market power.[33] But new technology demands new law.

The Article proceeds as follows. Part II argues that surge pricing is anticompetitive, harmful to consumers, and therefore should be banned under the antitrust laws. Part III refutes the objections that surge pricing is the best way to stimulate supply or to allocate scarce resources. Part IV considers the implications of this analysis for securities and commodities trading, the theory of price gouging, and the use of non-algorithmic price increases to respond to surges in demand.

II. WELFARE EFFECTS AND ANTITRUST CONSEQUENCES

A. SURGE PRICING AND ITS SPREAD

Some possible information age pricing practices, such as personalized pricing, remain but a twinkle in the eye of tech-savvy chief financial officers (CFOs).[34] But not surge pricing, which is far from being a unique contribution of Uber to information age dystopia. Surge pricing has, in fact, spread with remarkable speed across the business world over the past decade, and its roots stretch back further to the dawn of the computer age. American Airlines pioneered surge pricing in the 1970s, programming mainframe computers to implement it in crude form: charging higher prices for seats on full planes than for those on empty planes.[35] From there, surge pricing spread to the other airlines and then to the hospitality industry in the 1980s, which used it to charge higher rates for rooms in full hotels than for those in empty hotels.[36] Along the way, surge pricing grew more sophisticated and acquired the names "yield

32. ANDREW I. GAVIL, WILLIAM E. KOVACIC, JONATHAN B. BAKER & JOSHUA D. WRIGHT, ANTITRUST LAW IN PERSPECTIVE: CASES, CONCEPTS AND PROBLEMS IN COMPETITION POLICY 437 (3d ed. 2017).

33. Martin J. Adelman & Ernie L. Brooks, *The Integrity of the Administrative Process, Sherman Section 2 and Per Se Rules—Lessons of Fraud on the Patent Office*, 19 WAYNE L. REV. 1, 11 (1972).

34. *See* ARIEL EZRACHI & MAURICE E. STUCKE, VIRTUAL COMPETITION: THE PROMISE AND PERILS OF THE ALGORITHM-DRIVEN ECONOMY 89–100 (2016) (observing that personalized pricing is "unlikely in many markets in the near future").

35. RICHARD H. K VIETOR, CONTRIVED COMPETITION: REGULATION AND DEREGULATION IN AMERICA 63–64, 69–72 (1994); Robert G. Cross, Jon A. Higbie & Zachary N. Cross, *Milestones in the Application of Analytical Pricing and Revenue Management*, 10 J. REVENUE & PRICING MGMT. 8, 9–11 (2011).

36. Cross et al., *supra* note 35, at 11–12.

management" and "revenue management."[37] Before the internet, surge pricing appears to have been limited to travel, hospitality, parcel shipping, and auto sales, perhaps because sellers in those industries were some of the few to enjoy the scale necessary to invest in the sort of dedicated electronic communications networks required to manage surge pricing before the internet.[38]

The advent of the internet has eliminated the need to create proprietary electronic communications networks in order to run surge pricing operations, and has consequently made surge pricing available to businesses of virtually any size.[39] Apartment rental companies, which lack the scale of the hotel chains, now charge surge prices for apartment leases.[40] They use third-party pricing companies like RealPage to manage their prices.[41] Before the pandemic, Broadway shows were crediting surge pricing of theater tickets for a remarkable increase in profitability after years of hard times. Retail prices for Hamilton tickets spiked above one thousand dollars during peak periods of demand.[42] Indeed, much of the events industry has embraced surge pricing, applying it to

37. *Id.* at 10–11.

38. *See id.* at 12–15.

39. *See* Dax Cross, *A History of Revenue Management and the Advent of Next-Generation RM*, 15 J. REVENUE & PRICING MGMT. 293, 293–94 (2016).

40. Complaint at 2–3, United States v. RealPage, No. 1:24-cv-00710 (M.D.N.C. Aug. 23, 2024).

41. NOWSHABA AHMED, SHVETA CHITALE & YUE CHENG, APPLICATIONS OF REVENUE MANAGEMENT IN APARTMENT RENTAL INDUSTRY 20–22; Complaint, *supra* note 40.

42. Patrick Healy, *Broadway Hits Make Most of Premium Pricing*, N.Y. TIMES (Nov. 24, 2011), http://www.nytimes.com/2011/11/25/arts/new-pricing-strategy-makes-the-most-of-hot-broadway-tickets.html [https://perma.cc/ X7AM-46YT]; Michael Paulson, *High Ticket Prices Are Fueling a Broadway Boom*, N.Y. TIMES (May 23, 2017), https://www.nytimes.com/2017/05/23/theater/high-ticket-prices-are-fueling-a-broadway-boom.html [https://perma.cc/2JLV-EJTP]; Gordon Cox, *'Hamilton' Ticket Prices Hit $1,150 During Holiday Week*, VARIETY (Dec. 26, 2017, 11:33 AM PT), http://variety.com/2017/legit/news/hamilton-ticket-prices-1202648756 [https://perma.cc/9X9J-EDYK]. Broadway was pushed into surge pricing in part by the rise of automated ticket scalpers, which bought up tickets and then implemented their own surge pricing schemes in resale markets. James B. Stewart, *Broadway Tickets, for the Price of an Economics Lesson*, N.Y. TIMES (June 8, 2017), https://www.nytimes.com/2017/06/08/business/broadway-theater-ticket-prices.html [https://perma.cc/WA6C-B3SA]; Robert J. McFadden, *The BOTS Act: A Small Step for Fankind When a Giant Leap Is Needed*, 55 WASHBURN L.J. 427, 427–29 (2016). Whether the show or the scalper does it, consumers suffer, as we shall see in this Part. Congress has responded to scalping with legislation, but it is not clear why scalpers should be sanctioned but original sellers should not when they engage in the same practice. *Id.* at 428–29.

ticketing for pop concerts and sports games.[43] Ticketmaster uses surge pricing.[44] Even Disney World has gotten into the act.[45]

Most Americans are likely to have paid surge prices not to those companies, however, but to Amazon, which is a global leader in surge pricing, and markets its surge pricing services to the third-party sellers that use its platform.[46] During the first months of the pandemic, Americans noticed that toilet paper and hand sanitizer tended to be sold out at local brick-and-mortar stores but not on Amazon. Those items were available on the online retailer's website, but at higher prices. That is precisely what one would expect to see from a surge pricing leader.[47] Business has not, however, been alone in its embrace of surge pricing. Governments have been turning to the practice as well. Over the past two decades, states and cities around the country have started applying surge pricing to highway tolls. In 2025, New York City implemented the first urban congestion pricing plan in America, charging surge prices for access to downtown Manhattan.[48]

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43. *See, e.g.*, Steve Knopper, *Taylor Swift's Ticket Strategy: Brilliant Business or Slowing Demand?*, ROLLING STONE (Apr. 9, 2018), https://www.rollingstone.com/music/music-news/taylor-swifts-ticket-strategy-brilliant-business-or-slowing-demand-630218 [https://perma.cc/4EP9-EBV5] ("Superstars like Swift are increasingly using 'dynamic pricing' that shifts ticket prices constantly like airline seats."); Stephen L. Shapiro & Joris Drayer, *A New Age of Demand-Based Pricing: An Examination of Dynamic Ticket Pricing and Secondary Market Prices in Major League Baseball*, 26 J. SPORT MGMT. 532, 533–35 (2012).

44. *See How Are Ticket Prices and Fees Determined?*, TICKETMASTER, https://help.ticketmaster.com/hc/en-us/articles/9663528775313-How-are-ticket-prices-and-fees-determined [https://perma.cc/2ZSW-SPT4] (last visited Mar. 24, 2025) ("In some instances, events on our platform may have tickets that are 'market-priced,' so ticket and fee prices may adjust over time based on demand. This is similar to how airline tickets and hotel rooms are sold and is commonly referred to as 'Dynamic Pricing.'").

45. S.K., *supra* note 8.

46. *See* Kate Kaye, Walmart's Everyday Low Prices Face Amazon's Dynamic Price Push, ADAGE (Dec. 10, 2015), http://adage.com/article/datadriven-marketing/walmart-s-everyday-low-prices-face-amazon-s-dynamic-push/301613 (discussing Walmart's response to Amazon's changes in pricing); Bill Snyder, *Report Analyzes Amazon's Dynamic Pricing Strategy*, CIO (Jan. 16, 2015, 6:15 AM), https://www.cio.com/article/251070/report-analyzes-amazons-dynamic-pricing-strategy.html [https://perma.cc/Q2YJ-E2P4]; Kathy Kristof, *How Amazon Uses "Surge Pricing," Just Like Uber*, CBS NEWS (July 24, 2017, 10:08 AM), https://www.cbsnews.com/news/amazon-surge-pricing-are-you-getting-ripped-off-small-business [https://perma.cc/R8Y6-T2DX]; Harry Wallop, *How Online Giants Like Amazon Can Rip You off by Changing Prices up to 300 Times a Year (And if You're Rich, Some Websites Could Soon Charge You Even More!)*, DAILY MAIL, http://www.dailymail.co.uk/~/article-4935422/index.html; Ankitha Nagaraj, *Shipping From China To Amazon FBA—Everything You Need to Know*, SELLERAPP (Sept. 10, 2024), https://www.sellerapp.com/blog/how-to-get-your-shipments-from-china-to-amazon-fba [https://perma.cc/3N39-3NTA].

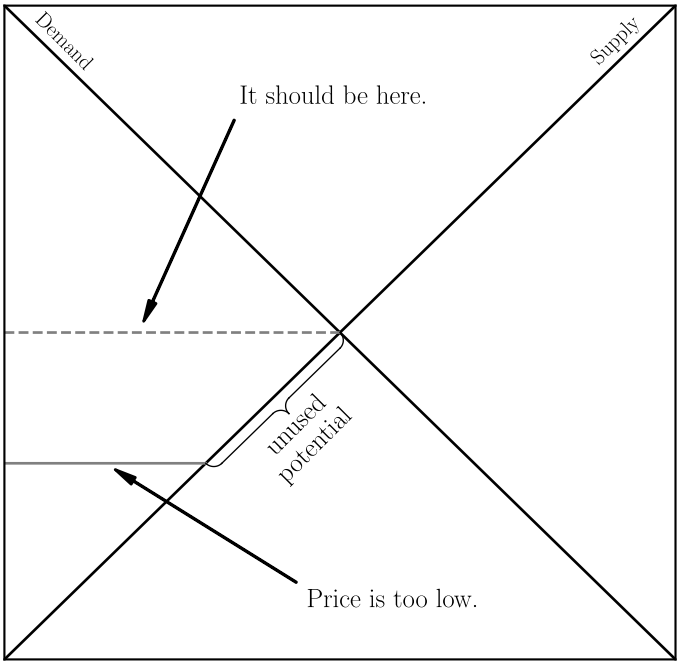
47. Adam Walser, *Data Shows Amazon Raised Prices during Pandemic alongside Sellers Accused of Price Gouging*, WFTS TAMPA BAY (Mar. 30, 2020, 11:28 AM), https://www.abcactionnews.com/news/local-news/i-team-investigates/data-shows-amazon-raised-prices-during-pandemic-alongside-sellers-accused-of-price-gouging [https://perma.cc/C4B3-VG33]. Surge pricing is an algorithmic form of price gouging. *See* Subpart.IV.A.2. From an economic perspective, they are the same thing. *See* Ramsi A. Woodcock, *Toward a Per Se Rule against Price Gouging*, CPI ANTITRUST CHRON., Sept. 2020, at 49, 50 ("Surge pricing is price gouging . . . .").

48. *See* Yingyan Lou, Yafeng Yin & Jorge A. Laval, *Optimal Dynamic Pricing Strategies for High-Occupancy/Toll Lanes*, 19 TRANSP. RSCH. PART C: EMERGING TECH. 64, 64–65 (2011); Jansen, *supra* note 8 ("Forty jurisdictions nationwide have adopted tolls that fluctuate depending on traffic congestion since Southern

B. WELFARE EFFECTS

The remarkable spread of surge pricing over the past decade provides a lesson in the dangers of making basic economics a required course for undergraduates, because defenders of surge pricing tend to insist that surge pricing equilibrates supply and demand.[49] The defenders seem to have before their mind's eye the classic supply and demand diagram in Figure 1, which if often the first graph a student encounters in an introductory economics course.

FIGURE 1



If demand exceeds supply at the current price, reason surge pricing's defenders, then the proper thing to do is to raise price and bring demand and supply back into agreement.[50] Only then will every unit of output for which value to

California adopted the first one in 1995."); Ana Ley, *Congestion Pricing Plan Set to Come to New York City on Jan. 5*, N.Y. TIMES (Nov. 22, 2024), https://www.nytimes.com/2024/11/22/nyregion/nyc-congestion-pricing-federal-approval.html [https://perma.cc/QJ7X-W46W]; Stefanos Chen & Winnie Hu, *In Congestion Pricing Fight, Trump Administration Ratchets Up Threats*, N.Y. TIMES (Apr. 21, 2025), https://www.nytimes.com/2025/04/21/nyregion/trump-nyc-congestion-pricing-threats.html [https://perma.cc/RE5P-BEFL]. For more on congestion pricing, see Winston Harrington, Alan J. Krupnick & Anna Alberini, *Overcoming Public Aversion to Congestion Pricing*, 35 TRANSP. RSCH. PART A: POL'Y & PRAC. 1, 1–5 (2001).

49. *See* Bilton, *supra* note 1; Murphy, *supra* note 2.

50. *See* Murphy, *supra* note 2. Figure 1 depicts a downward-sloping demand curve, so the firm would not actually wish to choose the price that equilibrates supply and demand in Figure 1. Instead, the firm would choose

consumers (the demand price) exceeds the cost of production (the supply price) actually change hands, maximizing welfare.[51]

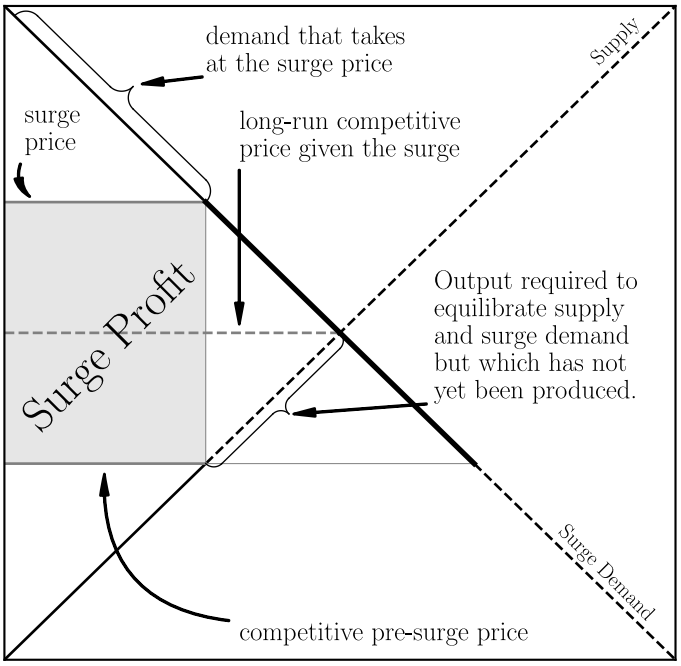
The trouble with this tale is that the economic problem created by a demand surge is not that the surge causes the market price to fall below the level that would equilibrate supply and demand, with the result that inventory that could be sold is left to rot, as would be the case for a market described by Figure 1. The problem is that there is not enough supply to satisfy demand at the price that would normally equilibrate supply and demand, because no one expected demand to be as high as it turned out to be (which is why demand is said to be "surging"), and so no one bothered to produce the extra supply needed to satisfy the high demand.[52] A genuinely unexpected surge in demand creates, in other words, a *shortage*, and the market therefore looks as it does in Figure 2.

a higher price to maximize profits. Technically, only a firm facing a flat demand line—meaning a demand line determined by a competitive market—would choose the price that equilibrates supply and demand. But it is hard to imagine competition making demand lines flat during an unexpected surge in demand to which competitors presumably cannot instantaneously adjust output. *But see supra* note 49 and accompanying text. However, the argument of surge pricing's defenders seems to be that raising prices at least *could* balance supply and demand, and so firms should be allowed to raise their prices.

51. *See supra* note 49 and accompanying text.

52. Ramsi A. Woodcock, *The Economics of Shortages*, LPE PROJECT BLOG (June 2, 2020), https://lpeblog.org/2020/06/02/the-economics-of-shortages [https://perma.cc/KKF6-QYL3] [hereinafter Woodcock, *The Economics of Shortages*]; Ramsi A. Woodcock, *The Hidden Shortages of the Market Economy*, LPE PROJECT BLOG (June 3, 2020), https://lpeblog.org/2020/06/03/the-hidden-shortages-of-the-market-economy [https://perma.cc/2PQ7-UWNZ] [hereinafter Woodcock, *The Hidden Shortages of the Market Economy*]. The output of some products can, of course, be increased instantaneously in response to an unexpected surge in demand. These are generally products that consist of information, and so exist in the same medium as price information, allowing them to be created in tandem with their prices. Thus, the output of a music download can increase just as quickly as a download's price. *See id.* It follows that for this limited subset of products, an unexpected surge in demand creates no power to increase price, for competitors can increase their output just as fast as price increases, taking market share away from the firm and negating the profitability of the price increase. Firms will not, then, engage in surge pricing with respect to this limited subset of products. Because there will be no surge pricing in this area to being with, it will not be necessary to exempt this area from the antitrust liability for surge pricing that will be discussed in Subpart.II.C.

FIGURE 2



During an unexpected surge in demand, simply raising price to the equilibrating level will not actually equilibrate supply and demand because there is no supply to sell to those buyers who, at the current price, are unable to buy.[53]

The problem the firm confronts when demand surges is not the problem familiar to undergraduate economics students of finding the equilibrium price, but rather that of determining how to ration a temporarily limited supply of output when demand exceeds supply.[54] The excess of demand in relation to supply is shown in Figure 2 by the excess length of the solid portion of the demand line in relation to the solid portion of the supply line (this excess length is shown in bold in the figure—the dashed portions of the demand and supply lines represent potential demand and supply, respectively, that does not actually exist). Every consumer occupying the solid portion of the demand line is willing to pay a price, labeled the "competitive pre-surge price" in the figure, that is high enough to cover the cost incurred by the firm in producing each unit of the output that the firm has available. But the output actually available, shown by the horizontal extent of the solid supply line, is insufficient to satisfy demand, shown by the horizontal extent of the solid demand line, at this price.

53. Woodcock, *The Economics of Shortages*, *supra* note 52; Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52.

54. Stewart, *supra* note 42 ("[D]emand at what people would consider a reasonable price far exceeds supply.[] From an economics perspective, 'this is simply a rationing problem[]' . . . .").

Before the information age, firms generally had only one option available to deal with a shortage created by a surge in demand: to continue to charge the price they would have charged absent the surge.[55] Firms choose their prices to cover their costs, so, before the surge, the firm would have chosen its price to, at the very least, cover the cost of producing its output, which means that the price would have equaled or exceeded the marginal cost of the most costly unit produced by the firm.[56] A pre-information-age firm would generally have continued to charge this cost-covering price during a demand surge, because the firm would have lacked the technological ability to raise prices much more quickly than the firm would have been able to eliminate the shortage by increasing output.[57] Before the information age, prices were not only information, but also physical goods: bits of paper upon which numbers were written. To change a price meant distributing new physical bits of paper with new numbers written on them, just as meeting a surge in demand required ramping up production of physical goods.[58] The speed with which prices could be changed was sometimes faster than the speed with which production could be increased—the process of printing and distributing a document is quicker than the process of building a new car, for example—but the time required remained within the same order of magnitude as that of producing physical goods.[59] That, in turn, meant that both prices and output were temporarily frozen during the surge in demand, at least for a time; neither could adjust immediately to take account of the shock.

Charging the pre-surge price during a surge in demand causes the good to sell out. As Figure 3 shows, at that price all consumers on the solid part of the demand line are willing to buy, but supply, represented by the solid part of the supply line, covers only a fraction of the horizontal extent of that solid demand line, so the good must sell out.

55. *See* BLINDER ET AL., *supra* note 12, at 226–53.

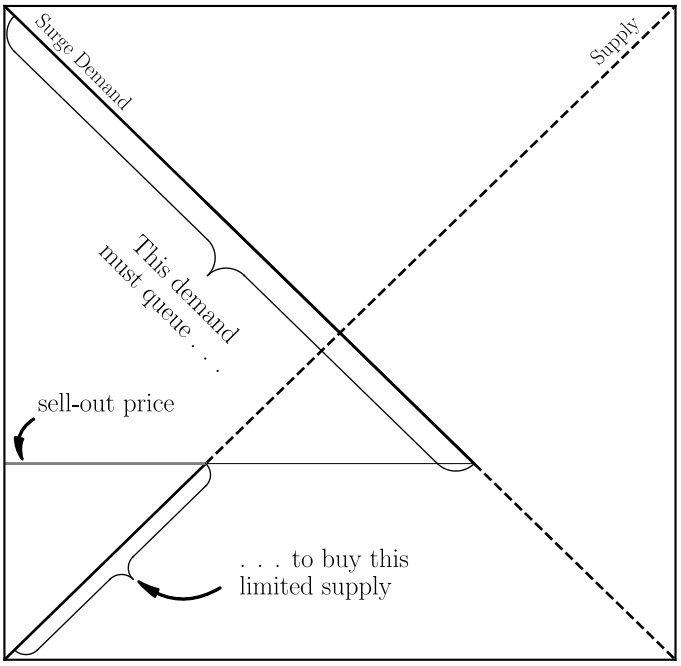
56. It is possible for the firm's price to have exceeded the cost of that marginal unit if the firm had market power and so faced a downward-sloping demand line. Indeed, such power is sometimes necessary to ensure that a firm can cover its fixed costs, which are in addition to the variable costs represented by a firm's supply line. (In Figure 2, the firm is assumed to have operated in a competitive market before the surge, and so the firm is shown to have charged a pre-surge price that intersects the supply line. If the firm had market power, that price line would hover above the supply line.). Either way, the important thing for purposes of this analysis is that the firm must have chosen the pre-surge price to equal or exceed the firm's costs of producing the amount of inventory that the firm intended to sell, otherwise the firm would not have chosen to remain in the market. Only in the special case of ruinous competition does a firm fail to choose a price that covers its costs (even in that case, however, the firm will choose a price that covers its marginal costs).

57. *See* BLINDER ET AL., *supra* note 12, at 226–53.

58. *See id.* at 227–28.

59. *See id.*

FIGURE 3



Which consumers in fact are able to buy the good at the pre-surge price depends on which consumers manage to line up to purchase the good first; the allocative consequences of queuing will be discussed in detail in Subpart III.C. It is important for now to note that only consumers who can afford to pay the cost of production of any of the units of output will purchase them. Charging the pre-surge price rations based on antecedence—the principle of first-come-first-served—but it does not make a good free in the sense of available to first comers no matter what price they are willing to pay. Instead, it makes the good available only to those first comers who belong to the rarefied group of consumers who are willing to pay for even the highest-cost unit of production. Those at the head of the line must still pay the good's price. That is why, in Figure 3, the solid part of the demand line, which represents consumers who are willing to buy at the pre-surge price, extends no lower than the highest point on the solid part of the supply line, which represents the highest marginal cost of producing existing inventory.[60]

60. For a graph that combines the lessons of Figure 2 and Figure 3, see Woodcock, *The Economics of Shortages*, *supra* note 52. If the pre-surge market is not competitive, and so the pre-surge price is above cost, then the solid part of the demand line would terminate at a level above that reached by the supply line, rather than, as pictured in Figure 3, terminating at the same level as the supply line. The implications are the same.

Letting a good sell out at its pre-surge price remains a common practice, as empty supermarket shelves during the pandemic attested.[61] But firms' information-age ability to engage in surge pricing throws open a second option that, as we have seen, is increasingly popular, which is to ration access to goods using price. Using the internet and algorithms instantaneously to adjust price, a firm can choose a new price that attracts just so many consumers as necessary to ensure that all of the existing supply of a good is sold. The firm will in effect raise price and drive consumers from the market until the number of consumers willing to pay the higher price is just large enough to ensure that all of the existing supply is sold. As Figure 2 shows, that price ensures that only the consumers with the highest willingness to pay, who fall along the highest part of the demand line, purchase the product. It also shows that surge pricing redistributes a sizable amount of wealth from consumers to the firm—an amount equal to the size of the shaded rectangle. This makes surge pricing a more profitable option than letting the good sell out at the pre-surge price (the case depicted in Figure 3). By rationing access based on willingness to pay, surge pricing unsurprisingly extracts the maximum possible profit from consumers.[62]

A firm facing an unexpected increase in demand can ration with price because all firms, and not just the firm in question, will be unable to increase output instantaneously in response to the demand surge, at least so long as the firm is no worse at demand prediction than competitors. It follows that if the firm raises its prices, competitors will not be able to take market share from the firm by selling additional inventory at lower prices, so the firm will have the power to raise its prices during the temporary period before output can increase. The downward slope of the demand line in Figure 2 (as well as Figure 1 and Figure 3) reflects this power, because the downward slope indicates that some consumers are willing to pay higher prices for the product. By contrast, if demand were flat, which occurs when the market is competitive, any price increase would cause demand to fall to zero.

The redistribution of wealth from consumers to the firm brought about by surge pricing makes surge pricing harmful to consumers. Indeed, surge pricing

61. *See, e.g.*, Winnie Hu, *Gone from Grocery Shelves, Now There's a Mad Dash to Find Them*, N.Y. TIMES (May 11, 2020), https://www.nytimes.com/2020/05/11/nyregion/Coronavirus-supermarkets-items-missing.html [https://perma.cc/XN39-A9MM].

62. It may be the case that raising price above that necessary to cause the amount demanded to equal pre-surge inventory—that is, raising price above the minimum necessary completely to ration existing inventory—would be profitable. This is a kind of surge pricing, and it would add to the natural scarcity associated with the unexpected surge in demand an artificial scarcity created by the firm, for then some units of pre-surge inventory would not sell. The analysis in this Article applies with equal force to this sort of surge pricing. But the discussion and figures explicitly treat only the case in which surge pricing precisely rations pre-surge inventory, creating no artificial scarcity. In other words, in this Article, the vertical line at the level of pre-surge output in Figure 2 will always define the surge price as the level at which the vertical line intersects with surge demand, as it does in that figure. But the arguments in this Article apply with equal force to the case in which it is profitable for the firm to raise its price above that level. The power created by the inability of output to adjust as quickly as price in response to surges in demand allows the firm to choose any price it wishes, including a price above that strictly necessary to ration access to pre-surge inventory, if such a price is more profitable.

harms consumers in the classic antitrust way of raising the price that consumers pay for a good above the minimum price needed to make the firm ready, willing, and able to produce the good.[63] That follows immediately from the assumption that the firm would have chosen the good's pre-surge price to cover the cost of producing the good at a volume that the firm believed would satisfy pre-surge demand for the good. If the firm chose the good's pre-surge price to cover the cost of producing the good, and the firm is unable to incur additional costs associated with producing additional inventory in the short run because the firm cannot increase production in the short run, then the firm does not need to raise the good's price in the short run in order to cover the cost of producing more of it, and so any increase in price during the period before the firm can ramp up production in response to the surge in demand must be unnecessary to cover costs.

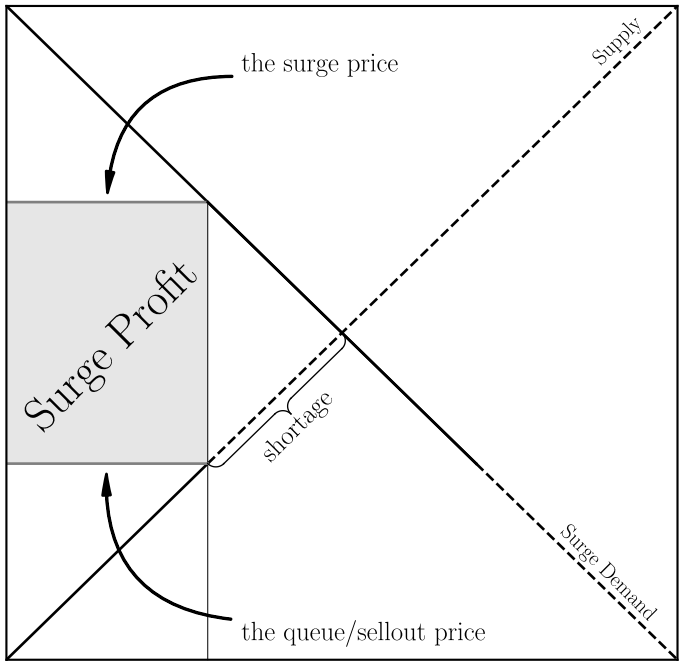
To be sure, were the firm able to increase output in response to the surge in demand, then an increase in price might be necessary to cover the cost of bringing more expensive units of output to market. But because the firm cannot adjust output instantaneously in response to the surge in demand, and, thanks to surge pricing, the firm has the power to increase price instantaneously in response to the surge in demand, the firm can always raise price before a higher price is needed to pay for increased output.[64] During the period when output remains fixed, any such increase in price by the firm is an instance of surge pricing and necessarily harms consumers.[65] The contrast between surge pricing and selling out is summarized in Figure 4.

63. For liability to exist, antitrust requires either proof of harm to consumers or, in the case of per se rules, actions from which harm to consumers may almost always be inferred. *See* Steven C. Salop, *Question: What Is the Real and Proper Antitrust Welfare Standard? Answer: The True Consumer Welfare Standard*, 22 LOY. CONSUMER L. REV. 336, 336–47 (2010); Broad. Music, Inc. v. Columbia Broad. Sys., Inc., 441 U.S. 1, 7–8 (1979). Consumers can be harmed only by the charging of prices in excess of costs. In the economic sense, costs are minimum payments necessary to make a firm ready, willing, and able to produce. *See* WILLIAM J. BAUMOL, ECONOMIC THEORY AND OPERATIONS ANALYSIS 593 (4th ed. 1977).

64. Woodcock, *supra* note 47, at 51–52.

65. *Id.* at 51.

FIGURE 4



C. ANTITRUST LIABILITY

1. The Existence of Anticompetitive Conduct and Monopoly Power

Legislatures could respond to the distributive harm of surge pricing by passing new laws that ban surge pricing. But surge pricing also has an anticompetitive characteristic that makes it a good candidate for condemnation under existing antitrust laws.[66] Surge pricing's anticompetitive characteristic is that it makes competition weaker. The pre-surge market price always reflects competitive pressure of some kind regardless of the structure of the market before the surge in demand—whether the market had one firm charging a monopoly price or many firms competing prices down to costs. A firm may be a monopolist in a particular market and still charge a price that reflects competitive pressures because all products compete with other products to some extent, even a monopolist's.[67] The firm that monopolizes all the aluminum in the country cannot charge too high a price, for example, because buyers must

66. 15 U.S.C. §§ 1–2 (2018).

67. *See* EDWARD H. CHAMBERLIN, THE THEORY OF MONOPOLISTIC COMPETITION: A RE-ORIENTATION OF THE THEORY OF VALUE 65 (7th ed. 1956) ("But if, in order to possess a perfect monopoly, control must extend to substitutes, the only perfect monopoly conceivable would be one embracing the supply of everything, since all things are more or less imperfect substitutes for each other.").

have some cash left over to buy food. It follows that aluminum competes with food: not hard enough to prevent an aluminum monopolist from charging a price in excess of cost, but hard enough to force the aluminum company to choose a price low enough to allow customers some room in their budgets for food. Firms in more competitive markets naturally face even more competitive pressure on price.

Without surge pricing, the effects of pre-surge competitive pressure extend into the surge period because, absent surge pricing, firms cannot raise their prices instantaneously in response to the surge in demand.[68] Absent surge pricing, a firm that cannot raise price before the surge because competitors wait in the wings will be forced to continue charging the same competitive price during the surge period even though competition has evaporated. The unexpected increase in demand outstrips the ability of the competitors waiting in the wings to increase output and undercut any higher price charged by the firm. But the firm will be unable to exploit this newfound freedom to raise price because the firm will lack the technical capacity quickly to adjust its price in response to the change in demand. This is true even for the monopolist who has no direct competitors waiting in the wings. The very fact that demand is surging for the monopolist's product implies that buyers of other products are now willing to devote more of their income to the monopolist's product, and so firms in other industries wishing to compete for those dollars may now wish to produce the monopolist's product.[69] But, of course, they cannot ramp up production of the monopolist's product instantaneously, and so the monopolist is free to raise prices during the surge without fear of competition—something the monopolist could not do before the surge, when consumers were unwilling to divert more of their spending to the monopolist's product. Without surge pricing, however, the monopolist will continue to charge the pre-surge price, because the monopolist will lack the technical ability to raise price, despite the demise of the competitive pressures that once constrained the monopolist's pricing. It follows that technological limitations on a firm's ability to raise price prolong the effects of competition in the pre-surge period into the surge period, and that surge pricing, in eliminating those technological limitations and enabling instantaneous price adjustment, destroys those effects of competition.[70] For this reason, surge pricing should count as anticompetitive conduct under the antitrust laws.

Most conduct that the courts classify as anticompetitive under the antitrust laws is *directly* anticompetitive in the sense that it hobbles competitors,

68. *See* BLINDER ET AL., *supra* note 12, at 226–53.

69. HOVENKAMP, *supra* note 15, at 356 (observing that "high profits will attract other producers into the market").

70. Woodcock, *supra* note 47, at 53–54.

preventing them from continuing to exert downward pressure on prices.[71] Surge pricing does not drive competitors from markets and so is not anticompetitive in this way. But some conduct that the courts classify as anticompetitive is, like surge pricing, only *indirectly* anticompetitive in the sense that it blunts the *effects* of competition, rather than competition itself. For example, the antitrust laws treat price fixing as anticompetitive conduct even when the price fixing amounts to no more than formalization of the tacit terms of preexisting, consciously-parallel conduct.[72] In this case, the price fixing agreement does not directly harm competition. The cartel members already destroyed competition when they first started tacitly colluding. But the agreement does allow the cartel members more fully to exploit their power.[73] Firms colluding tacitly can nudge each other in the direction of charging higher prices by suggesting a game of follow the leader, but they cannot pick a price target for the group and ensure that each member hits it; communication is required for that.[74] Thus, price fixing in this case solves a technical problem regarding the picking of collusive prices that magnifies the effects of a preexisting decline in competition. Surge pricing does the same thing and so should be treated as anticompetitive as well.[75]

Liability under the antitrust laws usually requires, in addition to proof of anticompetitive conduct, proof that the defendant has monopoly power, defined as the power profitably to raise price.[76] That requirement is necessarily met for any firm engaged in surge pricing because surge pricing is the act of raising prices above pre-surge prices that, as we saw in Subpart II.B, must be assumed to cover costs. Raising prices above costs redistributes wealth from consumers to firms. The courts do not require proof of power where the challenged action is certain or almost certain to harm consumers.[77] There should therefore be no need for plaintiffs to prove monopoly power in an action alleging surge pricing.

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71. For example, when antitrust law treats a refusal to deal with a competitor as anticompetitive, it does so because the refusal harms the competitor by denying it an essential input. HOVENKAMP, *supra* note 15, at 383 (noting that liability for a refusal to deal exists under the antitrust laws only if harm to "at least one rival" can be shown); *see, e.g.*, Aspen Skiing Co. v. Aspen Highlands Skiing Corp., 472 U.S. 585, 610 (1985) ("[T]he record supports an inference that the monopolist deliberate effort to discourage its customers from doing business with its smaller rival.").

72. *See* HOVENKAMP, *supra* note 15, at 327–35 (discussing the illegality of naked price fixing under any circumstance).

73. *See* Miguel A. Fonseca & Hans-Theo Normann, *Explicit vs. Tacit Collusion—The Impact of Communication in Oligopoly Experiments*, 56 EUR. ECON. REV. 1759, 1764–66 (2012) (finding experimental evidence that tacit collusion raises prices and explicit collusion raises them even more); *cf.* Phillip Areeda, *Market Definition and Horizontal Restraints*, 52 ANTITRUST L.J 553, 564 (1983) ("[Antitrust law] is violated by a merger which reinforces pre-existing . . . oligopoly pricing.").

74. *See* Fonseca & Normann, *supra* note 73, at 1770 ("[C]ommunication helps firms coordinating on a price or more sophisticated pricing patterns . . . . [And] conflict mediation to avoid the decline of prices . . . .").

75. *See* Woodcock, *supra* note 47, at 54.

76. John B. Kirkwood, *Market Power and Antitrust Enforcement*, 98 B.U. L. REV. 1169, 1173–74 (2018).

77. *See, e.g.*, Broad. Music, Inc. v. Columbia Broad. Sys., Inc., 441 U.S. 1, 19–20 (1979) (stating that a rule of per se illegality applies only to a practice that "facially appears to be one that would always or almost always tend to restrict competition").

When proof of monopoly power is not required, liability is said to be "per se"; surge pricing should be per se illegal.[78]

2. A Proposed Test

A per se rule against surge pricing should have the following elements. A firm that (1) uses algorithms to set prices, (2) experiences a surge in demand, (3) increases its prices in response to that surge, and (4) does so faster than the firm increases its supply violates Section 2 of the Sherman Act, which prohibits anticompetitive conduct by single firms.[79]

The first element—the use of algorithms—ensures that the firm has taken an affirmative step to cause the speed with which the firm can change prices to outstrip the speed with which the firm can adjust output. Firms have probably always had some power to identify demand surges and react to them faster than they can increase output. Long before the dawn of the information age, price stickers could be peeled off of cars and swapped for stickers bearing higher prices quicker than new cars could be produced. It would not be anticompetitive for firms to exercise this legacy, pre-information-age power any more than it would be anticompetitive for a firm that obtains a monopoly position by accident to charge a monopoly price.[80] What makes surge pricing anticompetitive is that the firm that engages in surge pricing uses algorithms to augment whatever pre-information-age power the firm may have to increase prices faster than output. The first element captures this important distinction.

The final three elements establish the existence of consumer harm. The second element—that demand surge—ensures that any price increase is not necessary to cover the cost, inclusive of fixed cost, of producing the inventory that the firm has on hand right before the surge starts. That will always be the case if demand surges, because a firm chooses its pre-surge price to cover its costs, and an increase in demand guarantees that a firm will be able both to charge at least that pre-surge price and to sell out of its inventory at that price. If, by contrast, demand were to *fall* unexpectedly, then a price increase might be necessary to cover costs, inclusive of fixed costs, on a smaller-than-expected volume of sales.[81] The second element rules out this justification for a price increase. The third element establishes that a price increase has in fact occurred. The fourth element establishes that the price increase could not have been necessary to pay for the production of additional, post-surge inventory because the price increase happened before output could be increased. If each of these three elements is met, it follows that there was a price increase that was not

78. *See, e.g.*, *id.*

79. *See* 15 U.S.C. § 2 (2018); HOVENKAMP, *supra* note 15, at 349.

80. *See* Oliver E. Williamson, *Dominant Firms and the Monopoly Problem: Market Failure Considerations*, 85 HARV. L. REV. 1512, 1513 (1972).

81. See *infra* Figure 9 in Subpart.II.F for an illustration of how price might fall in response to a demand shortfall.

necessary to cover the cost, inclusive of fixed costs, of either pre- or post-surge inventory and was therefore harmful to consumers.

D. OBJECTIONS BASED ON INNOVATION AND RISK

One common objection to claims in antitrust that a particular practice always harms consumers and so should be made per se illegal is that higher prices are needed to pay for costs of innovation that ultimately make consumers better off, even after taking the higher prices into account.[82] Such arguments do not apply here because surge pricing is a response to unexpected surges in demand. The firm therefore could not have taken the surge in demand into account in planning its research and development expenditures. As a result, profits obtained through surge pricing are never necessary to cover costs.[83]

One objection to the argument that profits from unexpected demand surges are never needed to cover costs is that a firm can use data on the probability of enjoying a surge pricing windfall to make investment plans. Firms can calculate the probability that surge pricing will produce profits and incur research and development costs equal to profits discounted by the probability that they will not materialize.[84] The trouble with this argument is that it gives no basis for assuming that if a firm is able to plan for more profits the firm will necessarily spend them on research and development or other investments.[85] If the logic supporting such a position were true, it would apply more broadly to all profits earned by firms in any fashion, and there could be no such thing as economic profit, understood as revenues in excess of costs. Whatever revenues a firm were to earn, no matter how large, would simply be cost, and consumers would not, as an economic matter, be entitled to any share of the gains from trade; indeed, there would be no gains from trade because any gains would be understood to be necessary to cover costs and so would not count as true gains at all.[86] But economists tend to assume that there are gains from trade. For example, they

82. *See* Verizon Commc'ns Inc. v. Law Offs. of Curtis V. Trinko, LLP, 540 U.S. 398, 407 (2004); Richard M. Brunell, *Appropriability in Antitrust: How Much Is Enough?*, 69 ANTITRUST L.J. 1, 1–2 (2001); Ramsi A. Woodcock, *Inconsistency in Antitrust*, 68 U. MIAMI L. REV. 105, 126–36 (2013) (critiquing this argument from a different perspective).

83. Firms could choose to invest their unplanned surge pricing windfalls in one-off research and development projects, but that is true of all profits, not just those generated from surge pricing. To suppose that firms will always spend their profits on research and development and so always use profits to benefit consumers rather than pay them to shareholders is unrealistic and would in effect redefine all profits as costs of production.

84. *See Verizon*, 540 U.S. at 407 ("The opportunity to charge monopoly prices—at least for a short period—is what attracts 'business acumen' in the first place; it induces risk taking . . . ."); Joseph A. DiMasi & Henry G. Grabowski, *R&D Costs and Returns to New Drug Development: A Review of the Evidence*, *in* THE OXFORD HANDBOOK OF THE ECONOMICS OF THE BIOPHARMACEUTICAL INDUSTRY 21, 38–40 (Patricia M. Danzon & Sean Nicholson eds. 2012) (arguing that large accounting profits on blockbuster drugs are not necessarily indicative of economic profits because most drugs fail and the profits on the blockbusters may be needed to pay the costs of the failures).

85. *Cf.* Ramsi A. Woodcock, *The Antitrust Case for Consumer Primacy in Corporate Governance*, 10 U.C. IRVINE L. REV. 1395, 1415–18 (2020) (rejecting this argument outside of the risk context).

86. *See id.* at 1415–16.

draw demand curves to start out substantially above supply curves in conventional economic modeling, implying that there are gains from trade.[87]

If in fact not all of the profits generated by surge pricing are likely to be necessary to cover costs, one may ask whether *any* of the profits generated by surge pricing might be necessary to cover costs. Costs are expenditures necessary to make a firm ready, willing, and able to produce at optimal levels. It follows that the question whether a new source of income (here surge pricing) should be opened up to firms depends on the optimal amount of investment in the economy. If revenue is already sufficient to allow firms to incur the optimal level of costs, then no additional income is required. Recent history suggests that none is required. For, until about a decade ago, no firm engaged in surge pricing.[88] If it were true that firms need surge pricing to incur the optimal level of costs, then one would expect that, up until ten years ago, there would have been many markets in which firms produced less than they optimally should have produced, fielded products that were of lower quality than they optimally should have been, or failed to enter the market at all when entering the market would have been good for the economy.[89] But do we believe this to be true? Did the economy of ten years ago grow at a slower rate than does the economy of today?[90] Did the public experience the economy of ten years ago as too small, insufficiently innovative, or lacking in important markets?[91] Conversely, can we attribute any meaningful part of the economic growth of the past ten years to the introduction of surge pricing?[92] The answers all appear to be no. If the economy was doing just fine without surge pricing, then we can infer that surge pricing is not, as a general, economy-wide matter, necessary to cover costs and so can safely be prohibited.[93]

This concludes the antitrust case against surge pricing. The remaining two Subparts of Part II are devoted to defining a surge in demand in greater detail and to distinguishing surge pricing from dynamic pricing.

87. *See, e.g.*, VARIAN, *supra* note 26, at 261 (providing a good example of how demand and supply are usually drawn).

88. *See* Ramsi A. Woodcock, *Big Data, Price Discrimination, and Antitrust*, 68 HASTINGS L.J. 1371, 1402–03 (2017) (making the similar argument that personalized pricing will not be needed to reward innovation if the economy is innovative enough today).

89. *See id.*

90. No. If anything, growth rates have been falling in the long term. *See U.S. GDP Growth Rate 1961-2025*, MACROTRENDS, https://www.macrotrends.net/countries/USA/united-states/gdp-growth-rate [https://perma.cc/5KQS-N6YN] (last visited Mar. 25, 2025).

91. Probably not. *See* Walter Isaacson, *How America Risks Losing Its Innovation Edge*, TIME (Jan. 3, 2019, 7:00 AM ET), https://time.com/longform/america-innovation [https://perma.cc/P28E-J4QL].

92. There appear to be no studies of same, but that in itself suggests that economists do not see an important macroeconomic role for surge pricing.

93. *See* Woodcock, *supra* note 88.

E. MORE ON HOW DEMAND SURGES

What exactly is a surge in demand? There are two kinds. The first, which is the focus throughout this Article, is the case in which demand increases at the margin, meaning that the amount of output demanded at the pre-surge price goes up: the marginal unit attracts additional demand, and the willingness of consumers to pay for that unit goes up, as shown in Figure 5 for the case of an initially competitive market (which is the case also depicted in Figure 1, Figure 2, and Figure 3) and in Figure 6 for the case of an initially uncompetitive market in which the firm has some power over price. In Figure 5, the marginal unit is defined by the point at which pre-surge demand equals supply; surge demand is higher at this point. In Figure 6, the marginal unit is defined by the point at which the monopoly price intersects pre-surge demand. Surge demand is again higher at this point.

FIGURE 5

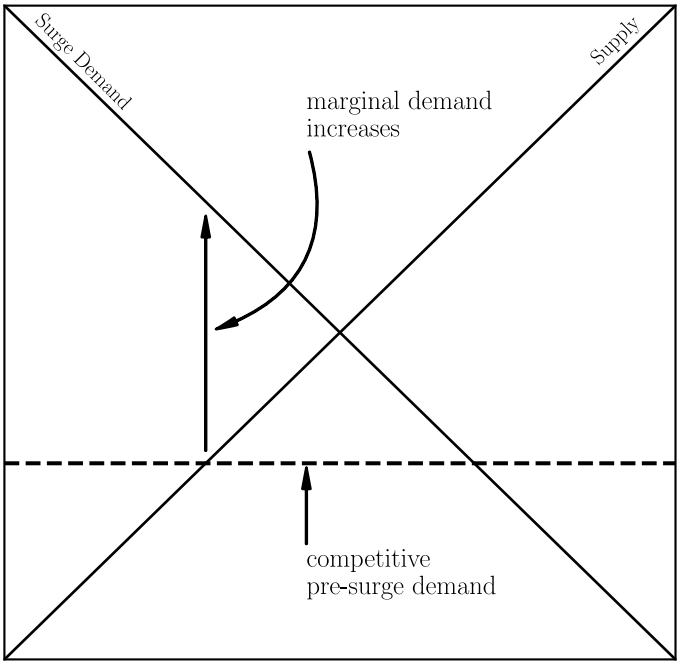
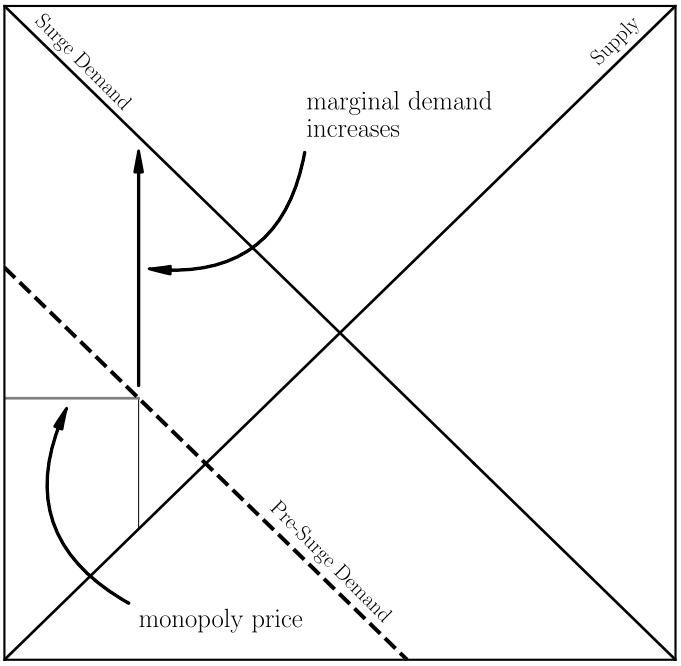


FIGURE 6



The second kind of demand surge is the case in which only demand for inframarginal units of production goes up; demand for the marginal unit remains unchanged. This is shown in Figure 7 for the case of an initially competitive market and in Figure 8 for the case of an initially uncompetitive market in which the firm has some power over price. In Figure 7, there is no increase in demand for the marginal unit, which is defined by the intersection of pre-surge demand and supply. Demand increases only for units to the left of that unit, which are the inframarginal units. In Figure 8, there is no increase in demand for the marginal unit, which is defined by the intersection of the monopoly price and pre-surge demand. Demand increases only for units to the left of that unit, which are, again, the inframarginal units.

FIGURE 7

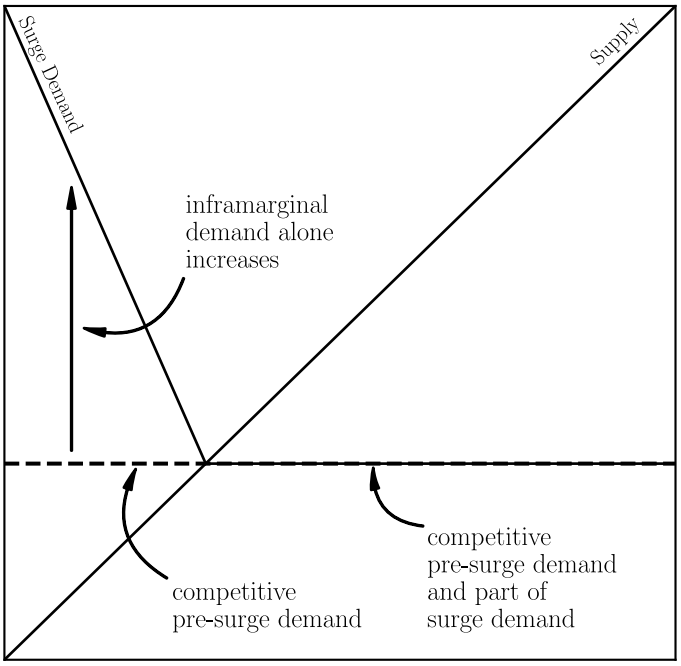

Surge Demand
Supply
inframarginal
demand alone
increases
competitive
pre-surge demand
competitive
pre-surge demand
and part of
surge demand

FIGURE 8

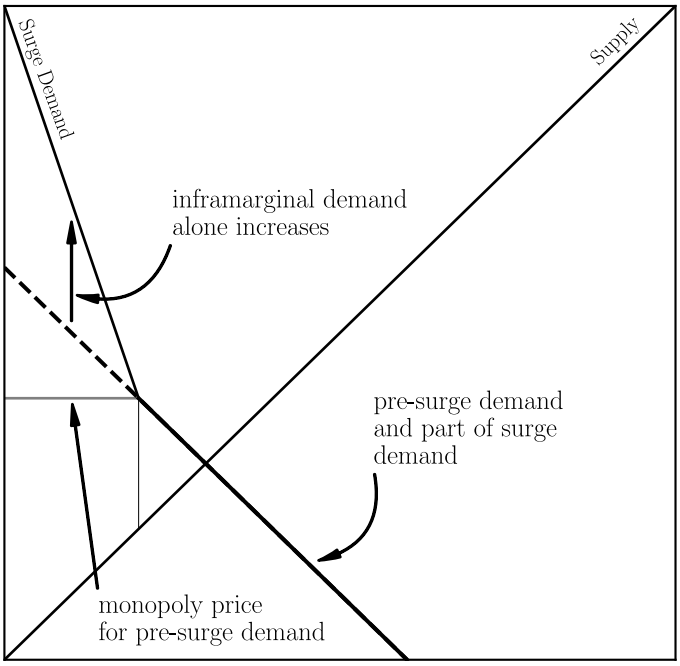


Figure 5 and Figure 6 show that a surge in marginal demand creates a shortage. The case for the consumer harm of surge pricing and per se antitrust liability clearly apply. In Figure 7 and Figure 8, however, there is no obvious surprise-induced shortage created by the surge in inframarginal demand. When inframarginal demand alone surges, there is no additional demand for the marginal unit and therefore no apparent shortage. Despite the apparent absence of a surprise-induced shortage in the case of a surge in inframarginal demand, the case for consumer harm and antitrust liability also applies to it. The reason is that, despite appearances, a surge in inframarginal demand actually creates a shortage. What is placed in short supply by a surge in inframarginal demand are other differentiated products rather than additional inventory of the same, undifferentiated product.[94] Because firms cannot introduce new, differentiated products instantaneously in response to an unexpected surge in inframarginal demand, they can raise prices for existing, pre-surge products during the surge, and thereby harm consumers.[95] But once enough time has elapsed for firms to introduce new differentiated products, the extra inframarginal demand for their pre-surge products will melt away as consumers purchase the newly introduced differentiated products instead.[96] Similarly, in the case of a surge in marginal

94. *See* CHAMBERLIN, *supra* note 67, at 115.
95. *See id.*
96. *See id.*

demand, firms eventually bring additional units of the product to market, satisfying the excess demand and eliminating the power over price initially enjoyed by firms during the surge period.[97]

In the antitrust literature, surges in inframarginal demand are often associated with innovation and product improvement: the firm improves its product, causing consumers to prefer the product over substitutes and thereby increasing consumers' willingness to pay for the product.[98] Should firms be allowed to exploit the surge in demand as a reward for innovative conduct? This argument has already been rejected in Subpart II.D, which dealt with the more general case in which a firm wishes to exploit any surge in demand, regardless of whether it is attributable to innovative activity, in order to cover the cost of research and development.[99]

F. DISTINGUISHING SURGE PRICING FROM DYNAMIC PRICING

The same pricing technology that has enabled surge pricing has also enabled firms to adjust their prices quickly in response to unexpected shortfalls in demand.[100] Antitrust cannot, however, prohibit such shortfall pricing, at least on a per se basis, because shortfall pricing does not always harm consumers. Rather than lead to above-cost prices that redistribute wealth, shortfall pricing often serves only to help firms cut their losses.[101] The reason is that a demand shortfall may eliminate demand for the marginal unit of production, rendering the firm no longer able to sell all of its inventory at the pre-surge price that the firm chose to cover its costs. This puts the firm in jeopardy of being unable to cover its fixed costs. The firm will respond by trying to maximize its "quasi-profit", which is its revenue net of variable cost, either by raising its prices or lowering them, as shown in Figure 9 and Figure 10.

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97. One difference between the way the story plays out for surges in inframarginal demand relative to surges in marginal demand is that in the case of inframarginal demand, surge pricing always causes some artificial scarcity. Price increases when marginal demand has not shifted always require a firm to leave some existing inventory unsold. In the case of marginal demand, however, surge pricing only sometimes leads to artificial scarcity. *See* BLINDER ET AL., *supra* note 12.

98. *See* F.M. SCHERER & DAVID ROSS, INDUSTRIAL MARKET STRUCTURE AND ECONOMIC PERFORMANCE 623 (3d ed. 1990); F.M. Scherer, *First Mover Advantages and Optimal Patent Protection*, 40 J. TECH. TRANSFER 559, 563–64 (2015); Woodcock, *supra* note 82, at 127–28.

99. *Cf.* Woodcock, *supra* note 88 (arguing that outside of the surge pricing context, aggressive antitrust enforcement in response to the rise of personalized and other data-driven forms of pricing should have no effect on innovativeness either, but for different reasons).

100. *See, e.g.*, Cross et al., *supra* note 35, at 10 (relating that the initial impetus behind American Airlines' pioneering of "yield management" algorithms was to find a way to lower price selectively in response to shortfalls in demand).

101. *Cf. e.g.*, *id.* (highlighting how the application of "yield management" helped Delta Airlines cut their losses from the previous year).

FIGURE 9

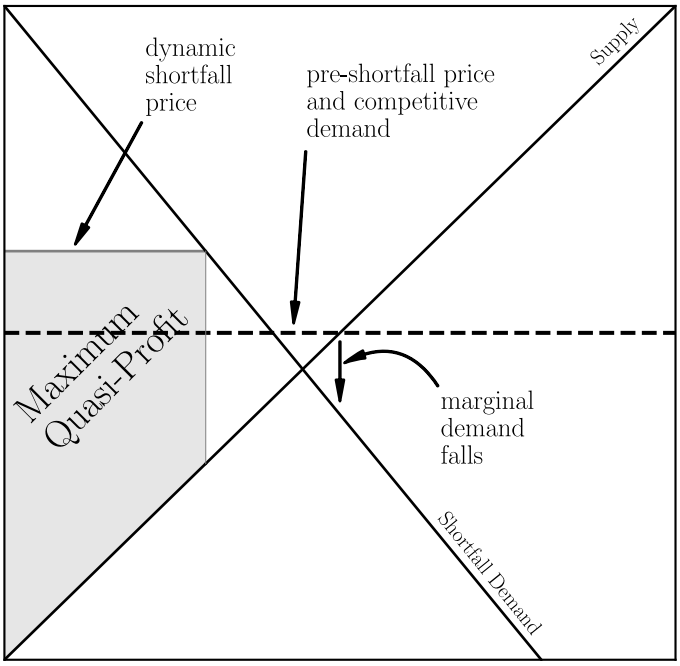
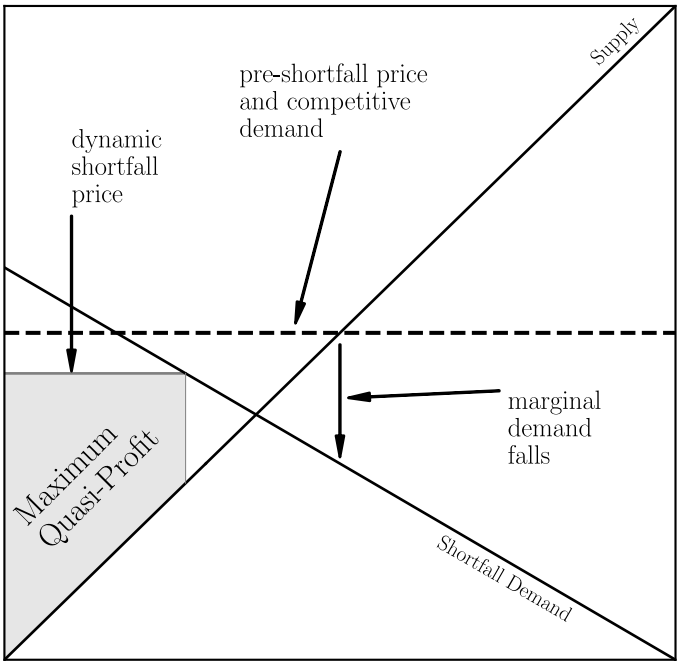

dynamic
shortfall
price
pre-shortfall price
and competitive
demand
Supply
Maximum
Quasi-Profit
marginal
demand
falls
Shortfall Demand

FIGURE 10



Whether the price change results in quasi-profits that cover the firm's fixed costs will depend on the size of those costs and the magnitude of the demand reduction. If the price change fails to cover the firm's fixed costs, or only just barely covers them, then there will be no harm to consumers. If instead the firm is able to adjust price to more than cover fixed costs—that is, to charge above-cost prices—then consumers will suffer. By contrast, in the case of a surge in demand, surge pricing always involves an increase in prices above costs that harms consumers. As we have seen, a surge in demand does not prevent the firm from continuing to sell its entire inventory at the pre-surge price that the firm chose to cover costs, including fixed costs, and so the only use the firm will have for a change in prices will be to charge above-cost prices and thereby to earn a profit.

In other words, a demand shortfall may lead to losses for the firm at the pre-shortfall price. As a result, price changes by the firm in response to a shortfall may serve only to mitigate losses rather than to generate profits at the expense of consumers. Therefore, consumer harm is not a necessary consequence of a demand shortfall. The reduction in sales at the pre-surge price associated with a demand shortfall potentially puts the firm in a loss-making position if the firm continues to charge the pre-surge price, and so it does not follow that any price change made by the firm in response must necessarily generate revenues in excess of costs in order for the firm to be willing to undertake it. As a result, the consumer harm that is the flipside of profit taking

cannot necessarily be inferred from a demand shortfall. It follows that the general practice of dynamic pricing, which includes algorithmic pricing in response both to unexpected surges and shortfalls in demand, cannot be condemned per se, unlike the subset of dynamic pricing that is surge pricing, which necessarily harms consumers and can be condemned per se.

III. ADDRESSING COUNTERARGUMENTS

As we built the case against surge pricing in Part II, we considered three objections to prohibiting surge pricing along the way. One was that surge pricing covers the cost of ramping up output to meet a surge in demand.[102] We saw that there are no increased output costs for surge pricing to cover, however, because surge pricing raises prices faster than output can adjust, so firms charge surge prices on existing inventory, not on new inventory produced in response to the surge. Another objection was the admonishment that what looks like profit-taking may well be necessary to cover the costs of innovation.[103] We rejected that objection because firms choose their pre-surge prices to cover their costs, including research and development costs, so prohibiting surge pricing is no threat to innovation. A final objection was that firms may incur costs that they believe that surge pricing profits are likely to cover based on data regarding the probability that a surge will occur. As a result, despite their uncertainty, surge pricing profits may be necessary to cover costs.[104] We rejected this objection because the vibrancy of the economy before the advent of surge pricing suggests that firms do not need the extra revenues provided by surge pricing in order to incur costs at optimal levels.

There are three other, more interesting objections to prohibiting surge pricing, which will be the subject of this Part. The first objection is that surge pricing is a signal to prospective entrants into the market that there is money to be made in satisfying the surge in demand.[105] According to this objection, surge pricing serves to hasten an increase in industry supply to meet the surge in demand, even if surge pricing itself is not required to pay for such an increase. The second objection is that surge pricing avoids the dislocations associated with the alternative of letting the good sell out, because surge pricing does not force buyers to wait in lines to acquire scarce inventory.[106] The final objection is that surge pricing allocates the limited inventory available during a demand surge to those who place the highest value on the inventory, whereas the alternative of letting the good sell out does not allocate the inventory to those who value it the most.[107]

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102. *See supra* Subpart.II.B.
103. *See supra* Subpart.II.D.
104. *See supra* Subpart.II.D.
105. *See infra* Subpart.III.A.
106. *See infra* Subpart.III.B.
107. *See infra* Subpart.III.C.

A. SURGE PRICING SIGNALS

Let us turn to the first objection—that surge pricing is a signal to prospective entrants into the market that there is money to be made in satisfying the surge in demand. The core of the argument is that the high price set by surge pricing tells other firms that they might be able to charge a similarly high price if they ramp up production to satisfy the excess demand associated with the surge.[108] If other firms can bring more of the product, or a close substitute, to market more quickly than the firm can ramp up its own output in response to the surge in demand, then the signal sent by the high price may hasten the end of the shortage.[109] Before the surge, the other firms might have chosen not to enter the market because their production costs exceeded those of the firm and so they would not have been able to match the pre-surge price charged by the firm.[110] When the firm implements surge pricing in response to the surge in demand, however, the higher, surge price tells these other firms that demand may now be sufficiently large that they can enter the market and charge the higher prices they need to charge in order to cover their higher costs.[111] And so these firms may now enter the market and satisfy the excess demand.[112] The surge pricing serves, in effect, as a way for the firm to call in the cavalry to increase industry-wide output.[113]

This argument acknowledges that surge pricing harms the firm's customers. Surge pricing is not needed to cover the firm's production costs because, as we have already seen, surge pricing raises price faster than the firm can increase its output, and so the firm does not have any higher costs to cover at the time that the firm raises price, making the price increase a pure wealth transfer from consumers to the firm. But, the argument goes, this harm is more than offset by the benefits consumers enjoy from obtaining quicker access to additional output thanks to the response of competitors to the signal sent by the firm's surge price.

If one actually attempts to add up the costs and benefits, the conclusion is not quite so clear. Depending on how demand surges—that is, depending on the shape of the demand curve during the surge—and depending on the prices

108. *See, e.g.*, J.D. Tuccille, *Price-Gouging Laws Will Do More Harm Than Good During the Coronavirus Pandemic*, REASON (Mar. 16, 2020, 8:45 AM), https://reason.com/2020/03/16/price-gouging-laws-will-do-more-harm-than-good-during-the-coronavirus-pandemic [https://perma.cc/S99C-5BR7] ("[Rising price tell] manufacturers and distributors that they should increase production. . . ."); Antony Davies & James Harrigan, *'Price Gouging' During Crisis a Good Thing*, TRIBLIVE (Mar. 14, 2020, 7:00 PM), https://triblive.com/opinion/antony-davies-james-harrigan-price-gouging-during-crisis-a-good-thing [https://perma.cc/DU9G-MMM9] ("The higher the price of surgical masks, the more incentive manufacturers have to work around the clock to make more, and to feed them into the supply lines.").

109. *See* Tuccille, *supra* note 108.

110. *See id.*

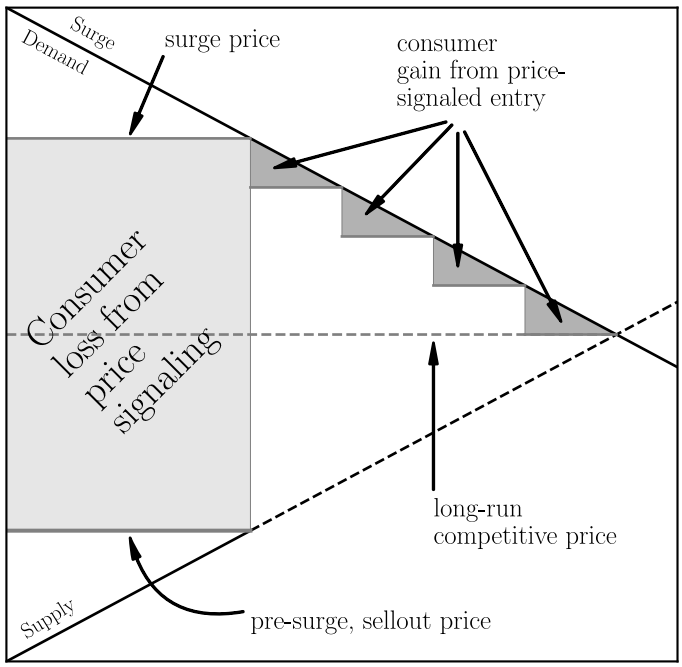
111. *See id.*

112. *See id.*

113. *See id.*

charged by competitors that respond to the price signal, consumers might actually be better off as a group without surge pricing, as shown in Figure 11.

FIGURE 11



Competitors that take the surge price as a signal will tend to enter the market charging a high price that only consumers at the very top of the demand line are willing to pay, as shown in the figure. As additional firms enter, they will compete price down, creating the descending steps in price shown in the figure. The area above the steps represents the welfare gain of consumers when firms enter the market in response to a surge price signal relative to the baseline in which there is no surge pricing and no firms enter the market to increase industry output. The firm's profit rectangle represents the loss to consumers of surge pricing relative to the same baseline. If the area above the steps is less than the area of the firm's profit rectangle, then consumers would be better off were there to be no surge pricing and therefore no signaling or entry from competitors. The possibility that signaling reduces consumer welfare despite drawing firms into the market will not, however, be considered further. We will assume, for purposes of argument, that the harm of surge pricing is more than offset by the benefits of signaling-induced market entry.

Even after assuming away the possibility that consumers might be better off without signaling-induced entry relative to the baseline in which there is no surge pricing and no market entry, a fatal flaw in the signaling argument remains. The trouble is that the argument assumes, without justification, that

when a firm chooses to let a good sell out rather than charge a surge price for it, no signal will be sent to the market regarding the existence of a shortage and no firms will enter the market in response. In fact, selling out at the pre-surge price *also* sends a signal, one that, thanks to the internet, should do just as good a job as a surge price at enticing firms to enter the market while keeping prices lower than under surge pricing.[114] The signal is the fact that the firm has sold out at the pre-surge price.[115] The signal that a firm has sold out at the pre-surge price may induce competitors to enter the market and satisfy the excess demand.[116] A competitor that observes that the firm has sold out without altering its price can infer that there are likely some consumers in the market who are willing to pay at least a slightly higher price but who are unable to buy.[117] If, before the surge, the firm had chosen not to enter the market because price was too low to cover the firm's costs, now the firm can expect to be able to charge a slightly higher price for its good that may cover the firm's costs. If the slightly higher price would cover the firm's costs, the firm will enter the market.[118]

Thanks to the internet, competitors now find it just as easy to observe the signal sent by selling out as to observe the signal sent by high prices. Before the information age, a competitor was more likely to observe a higher price than the fact that a good had sold out, because sellers advertise price information, but not a lack of inventory. Today, any competitor can visit the product pages on a firm's ecommerce website to learn that a good has sold out, just as competitors can visit the same pages to learn the good's price.[119]

Because both surge pricing and selling out send equally accessible signals, whether surge pricing is to be preferred over selling out depends on which sends a signal in a way that is most beneficial to consumers. Market entry in response to a sold out signal will differ from entry in response to a surge price signal. Initially, only those firms that have production costs that are slightly higher than the pre-surge price will enter in response to a sold out signal.[120] Higher-cost firms will hold back because the signal that a firm has sold out at the pre-surge price contains no information regarding how much more consumers are willing to pay to satisfy their excess demand. The signal that a firm has sold out contains only the information that consumers are likely willing to pay at least a bit more than the pre-surge price. By contrast, surge prices beckon into the market not only those competitors that have costs slightly in excess of the pre-surge price, but also competitors that have costs much in excess of the pre-surge price

114. *See* Woodcock, *The Economics of Shortages*, *supra* note 52; Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52; Woodcock, *supra* note 47, at 55.

115. Woodcock, *supra* note 47, at 55.

116. *Id.*

117. *Id.*

118. *Id.*

119. *Cf.* Ramsi A. Woodcock, *The Obsolescence of Advertising in the Information Age*, 127 YALE L.J. 2270, 2299 (2018) (making the related argument that the internet has made all the product information that a consumer could ever need freely available online).

120. *Id.*

because a firm's surge price is often far higher than the pre-surge price. Indeed, surge prices beckon into the market all firms that can possibly satisfy the excess demand, not just those that can do so at the lowest cost, because the firm's surge price approximates the maximum that consumers are willing to pay for additional output.[121]

The fact that surge pricing beckons more firms into the market than does selling out seems to suggest that surge pricing does a better job of calling in the cavalry to satisfy excess demand than does selling out, making surge pricing the better choice for consumers. But surge pricing may not beckon quite as many firms into the market as first appears. In particular, savvy high-cost producers will understand that lower-cost producers will still have a greater incentive than they to enter the market, as lower-cost producers will be able to charge the same near-surge prices as the high-cost producers, but face lower costs. And once lower-cost producers are in the market, their lower costs will allow them to undersell any high-cost producers who enter, denying the high-cost producers any opportunity to earn a profit. So high-cost producers may delay market entry to see whether lower-cost producers appear, leading to much the same result as under the sold out signal, which will tend to beckon only lower-cost producers into the market.

The ambiguity of the surge pricing signal relative to the sold-out signal also suggests that the surge pricing signal is unlikely to draw many more competitors into the market. A high price presents a somewhat more ambiguous signal to other firms that there is excess demand in the market than does information that the firm has sold out. For, as we saw in Subpart II.F, a firm might raise price in response to an unexpected shortfall in demand as well as in response to an unexpected surge in demand.[122] If a firm raises price due to a demand shortfall, but a competitor mistakes the price increase for a signal that demand is surging, the competitor will suffer a loss upon entering the market, because the competitor will be unable to find buyers for its goods. Competitors will therefore hesitate before rushing into a market in response to a surge price. By contrast, selling out sends an unambiguous signal that demand has surged. When demand declines, goods do not sell out; they rot on shelves. Thus, a low-cost competitor that observes that a firm's inventory has sold out can enter the market confident that the market contains buyers whom the firm is unable to satisfy at any price—at least so long as the competitor enters before the firm can ramp up output.

Even if surge pricing does manage to call more producers into the market than does selling out, consumers may still not end up better off as a result. The producers that surge pricing beckons into the market are likely to charge higher prices to consumers than they would if beckoned in by information that the firm

121. The surge price will tend to be a bit above consumers' maximum willingness to pay for additional output, because demand slopes downward.

122. *See supra* Subpart.II.F.

has sold out, regardless whether the producers produce at high or low cost.[123] That is because surge pricing provides an approximate signal regarding the maximum that consumers are willing to pay. That grants producers a crucial piece of information regarding the maximum price that they can charge.[124] Whether their costs are low or high, producers will use this information to charge consumers the highest possible prices. That is unless consumers are fortunate enough to be in a market in which multiple firms are able to enter the market in response to the signal at the same time and competition between the new entrants keeps their prices down. But multiple entry is not a foregone conclusion in the context of a demand surge that has taken the market by surprise.[125]

In the absence of multiple simultaneous entry, the result could even be the equivalent of perfect price discrimination. If a producer beckoned into the market is unable to sell all of its inventory at the high price it initially charges, it will respond by charging a slightly lower price. If it fails to sell all of its inventory at the slightly lower price, it will again cut its price. As a result, consumers' excess demand will be satisfied in a way that approximates perfect price discrimination, with price stepping down as demand steps down. Each consumer will pay an approximation of the consumer's maximum willingness to pay and will enjoy little or no surplus, as Figure 11 approximately depicts.[126] In that figure, the successive entry of additional firms into the market steps price down until the excess demand is satisfied. As we have already seen, the prices charged by the additional firms limit consumer welfare to the series of relatively small gray rectangles that remain above the steps but below the demand line. In broadcasting to the market an approximation of the maximum that consumers are willing to pay for the satisfaction of their excess demand, surge pricing deprives consumers of a bargaining advantage that every trader holds dear: the ability to hide one's reservation price.[127] Stripped of this defense, consumers are vulnerable to exploitation by firms.[128]

By contrast, the sold out signal tells producers only that there is excess demand at the original, pre-surge price, but not how much consumers are willing to pay for the satisfaction of their excess demand.[129] As a result, only firms that have costs that are close to the pre-surge price will initially consider entering the market.[130] If they do enter, they will enter at a price that is close to the original

123. Woodcock, *supra* note 47, at 55.

124. *See* Ramsi A. Woodcock, *Personalized Pricing as Monopolization*, 51 CONN. L. REV. 311, 324 (2019).

125. *See id.* at 331.

126. *See* VARIAN, *supra* note 26, at 445 ("Under . . . perfect price discrimination, each unit of the good is sold to the individual who values it most highly, at the maximum price that this individual is willing to pay for it.").

127. *Cf.* San Bolkan & Alan K. Goodboy, *Negotiating in Distributive Bargaining Scenarios: The Effect of Sharing One's Alternative*, 72 COMMC'N STUD. 720, 730 (2021) (finding via experiment that disclosure of one's best alternative to a negotiated agreement causes buyers to pay more).

128. *Id.* at 731.

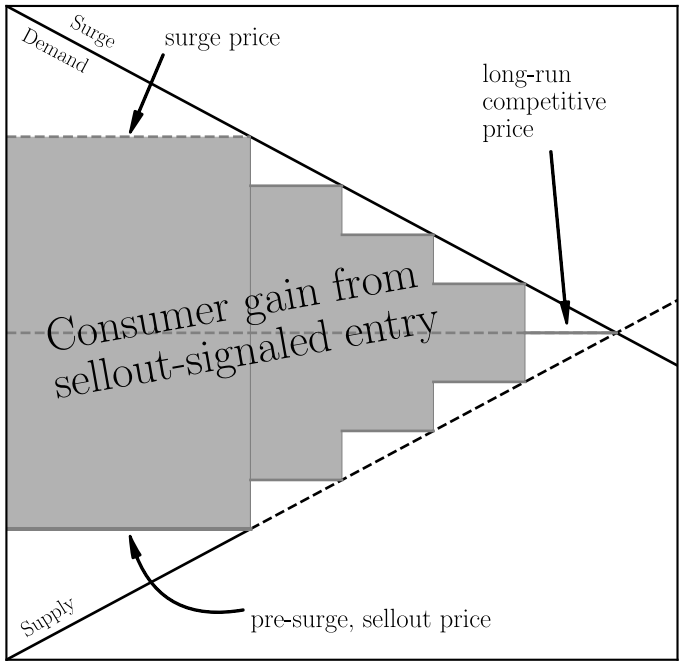
129. *See* Woodcock, *supra* note 47, at 55.

130. *See id.*

pre-surge price, and to their own costs, rather than close to the maximum that consumers are willing to pay.[131] Moreover, high-cost producers may also enter the market in response to a sold out signal. If the low-cost producers that enter the market prove incapable of fully satisfying the excess demand at a price slightly above the pre-surge price, then the sold-out signal will persist. But the signal will persist at a higher price because the low-cost producers that entered must have higher costs than the firm that sent the original sold-out signal (otherwise the low-cost producers would already have been in the market before the surge). As a result, the low-cost producers that entered will necessarily have sold their output at a price above the pre-surge price. The message that these low-cost entrants have themselves sold out at higher prices will beckon producers with slightly higher costs into the market. This cycle will continue until demand is satisfied or the highest-cost producers have been drawn into the market. Thus, the sold-out signal is capable of drawing high-cost producers into the market. But, unlike the surge price signal, which encourages producers initially to charge the highest possible prices when they enter the market, and allows high-cost producers to enter at the same time as low-cost producers, the sold-out signal draws producers into the market starting with those having the lowest costs and charging the lowest prices. This progression from low cost and low price to high cost and high price associated with the sell-out signal both minimizes production costs (and so maximizes efficiency) and also maximizes consumer welfare by keeping prices as close to costs as possible. Because low-cost, low-price entry happens first in response to a sold-out signal, a sold-out signal leaves consumers with a larger share of the surplus generated by satisfying the excess demand. Figure 12 shows the additional surplus enjoyed by consumers relative to surge pricing that elicits the stepped-down, price-signaled entry depicted in Figure 11.

131. *See id.*

FIGURE 12



As Figure 12 shows, the sold-out signal causes price to march up the supply curve instead of down the demand curve, as in the case of the surge pricing signal. Indeed, the sold-out signal causes market entry in response to the surge to follow the price and cost trajectory that a competitive market would follow in ramping up output in response to a demand surge because, in a competitive market, price follows the intersection of supply and demand as the demand curve marches up the supply curve. In both a competitive market and a market governed by a sold-out signal, the lowest-cost producers are drawn into the market first and the highest-cost producers last.[132] As a result, the sold-out signal enables consumers to capture most of the surplus created by market entry, in contrast to the surge pricing signal, which enables firms to capture most of the surplus created by market entry. In Figure 12, the consumer gain from sell-out signaled entry covers most of the area between the supply and demand curves because shifting from the surge pricing signal to the sell-out signal redirects most of the surplus created by market entry from firms to consumers.

For all these reasons, there is no basis for supposing that the surge-price signal makes consumers better off than the sold-out signal, and indeed some reason to suppose that the sold-out signal is better for consumers. It follows that signaling arguments are no objection to prohibiting surge pricing.

132. *See* Woodcock, *supra* note 47, at 55.

B. SURGE PRICING INVOLVES NO WAITING

Let us turn to the second objection to selling out—that surge pricing avoids the dislocations associated with selling out because surge pricing does not force buyers to wait in line to acquire scarce inventory. This argument might have made sense twenty years ago, before online shopping had penetrated every corner of the economy. At that time, selling out brought with it terrible dislocations not associated with high prices, particularly the burden of waiting in physical lines.[133] Back then, to allow the good to sell out meant putting buyers to the trouble of coming down to the store only to find that the inventory was gone, changing plans to get to the store quicker before the inventory ran out, or joining a crowd swollen with buyers all concerned that they would be left unsatisfied—a crowd that might overwhelm, by its size, the ability of the store to process orders quickly. All of these dislocations were wasteful of time that could be spent on productive activities. They made selling out a socially costly signal.[134]

Given the time and planning costs that were once associated with selling out, charging high prices was, at the time, a more efficient way of rationing access to scarce inventory. The charging of high prices created less dislocation than selling out: the firm announced a higher price and, before the good started to sell at all—much less sell out—buyers sorted themselves into two groups: those who could afford to buy at the new price and those who could not.[135] Those who could afford to buy went down to the store to buy and those who could not afford to buy did not.[136] There was no waste of time. Before the information age, high prices solved the allocation problem in the time it took to transmit price information, rather than in the time it took for a customer physically to visit a store, or to wait therein. That gave high prices a distinct advantage as a rationing mechanism.[137]

The irony of the information age is that at the same time that it has made it possible for firms to engage in surge pricing, it has also eliminated the dislocation associated with rationing through selling out, thereby erasing the

133. *See* Cross, *supra* note 39, at 293–94.

134. *See* Yoram Barzel, *A Theory of Rationing by Waiting*, 17 J.L. & ECON. 73, 73 (1974); Deacon & Sonstelie, *supra* note 28, at 627–28; *see also* Cotton M. Lindsay & Bernard Feigenbaum, *Rationing by Waiting Lists*, 74 AM. ECON. REV. 404, 404 (1984).

135. *See* VARIAN, *supra* note 26, at 7–8.

136. *See id.*

137. A price signal can sort consumers before they go down to the store only if consumers actually receive notice of the firm's change in price. If they do not, then surge pricing can still create some of the dislocation associated with selling out. The customer who comes down to the store only to learn that a good is now too expensive to buy is subject to as much inconvenience as the one who comes down to the store only to learn that the good has sold out. Additionally, unexpected price increases upset plans to the same extent as unexpected shortages in supply. But even an uncommunicated surge in prices will not lead to lines. Consumers who come down to the store only to find that prices are too high leave; they do not wait in lines. Moreover, firms have an incentive to disseminate information about high prices widely, because, unlike the information that the firm has sold out, high prices generate economic profits. *See supra* Subpart.II.B. Thus, before the information age, signaling with price had an advantage.

efficiency advantage of surge pricing.[138] Today, the advantage of charging high prices over selling out is gone with respect to goods that can be purchased online, including those that can be purchased online for in-store pickup. For this vast set of goods, the internet has caused the time required to learn that a good has sold out to fall to the amount of time required to learn that a price has risen. As already noted in Subpart III.A, Both pieces of information can be conveyed at the same speed over the internet. This has eliminated the advantage of high prices as a rationing mechanism.[139] Consumers know when goods sold online have temporarily sold out because firms list them as out of stock on their product pages.[140] But once consumers have access to the online information that a good has sold out, all of the dislocations associated with selling out disappear.[141] Consumers today no longer need go down to a physical store in order to learn that a product is unavailable. They can simply log into the seller's website and either buy or face the "sold out" sign.[142] Every time a consumer logs into an ecommerce website only to find a "sold out" sign, the consumer has in effect waited on an instantaneously clearing line.[143] Economists once characterized selling out as "rationing by waiting"; today it is merely rationing by antecedence.[144] The ability to purchase goods online means that no customer today need rush down to a physical store for fear that a product might sell out. And no crowd of customers need ever overwhelm the ability of a physical store to process orders quickly. The seller's computer can process thousands of order requests per second, so order processing capacity, the bottleneck that drove pre-information-age lines, is gone other than for the very largest crowds.

The newfound efficiency of selling out is one of the quieter revolutions of the information age. But it is everywhere. One sees it even in Uber, which seems

138. *Cf.* Ramsi A. Woodcock, *supra* note 119, at 2274 (discussing the other irony of the information age that enabled advertisers to target advertising with greater accuracy than ever before and made advertising obsolete by allowing consumers to obtain virtually all product information for free over the internet).

139. To be sure, surge price information still arrives earlier than the information that a good has sold out because of course things must have prices before they can sell at all, making price signaling somewhat quicker. But this may merely compensate for the flaw in price signaling that the price signal is more ambiguous regarding whether demand is surging than is information that the good has sold out. *See supra* Subpart.III.A. Recall that both demand shortfalls and demand surges can lead to higher prices, but only a demand surge creates an opportunity for competitors to enter the market. By contrast, demand shortfalls tend to squeeze firms out of a market. It follows price signaling may be slower to beckon firms into the market than selling out because the price signal is ambiguous, but price signaling may be quicker at beckoning firms into the market than selling out because price information necessarily reaches consumers faster than does the information that a firm has sold out. The net effect of these two opposed tendencies may be zero.

140. *See* Dale Bertrand, *Sold Out Items: How They Can Hurt SEO & What You Can Do About It*, FIRE & SPARK: EMBER MKTG. BLOG (May 14, 2019), https://www.fireandspark.com/blog/sold-out-products-can-hurt-your-seo [https://perma.cc/GVX8-QCRK] ("If you remove a page entirely, you'll lose both organic traffic and sales generated by the product page itself." (emphasis omitted)).

141. *See* Woodcock, *The Economics of Shortages*, *supra* note 52; Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52; Woodcock, *supra* note 47, at 55.

142. *See* Woodcock, *supra* note 47, at 55.

143. *See id.*

144. *See* Barzel, *supra* note 134, at 73.

to give users a "no cars available" message (i.e., to sell out) as often as it engages in surge pricing.[145] Travelers once waited in line at airport taxi stands to determine whether they would be able to take a cab home. Now they log into Uber and either book a ride or learn immediately that there are no cars available in the area.[146] Consumers used to wait in line for groceries during natural disasters. No longer. Today they log into a supermarket website and arrange for curbside pickup.[147] One either finds an available timeslot or one does not; there is no wait involved.[148] To find out whether a good is sold out on Amazon, one spends no more than the seconds it takes to visit the retailer's website.[149] The closest equivalent to the line today is the website refresh that is sometimes required when trying to get tickets to a hot sporting event or concert.[150] But that is nothing like waiting in line for hours at the ticket window. Even the famous Black Friday lines for Thanksgiving sales have gone virtual, and so clear instantaneously.[151]

Of course, many internet users continue to wait in lines in the sense that after finding a product to be sold out they must wait for the product to become available again.[152] But this does not suggest that surge pricing remains a better way to ration access to goods in short supply. Regardless of what mechanism a firm uses to ration, whether a price mechanism or selling out, those who are not granted access through the rationing mechanism must wait for additional supply to arrive. Under a price mechanism, those who cannot afford the high price must do the waiting.[153] Under a regime of selling out, those who are too slow to buy

145. *See Uber No Cars Available (Why the Error and How to Fix)*, RIDE FAQS, https://ridefaqs.com/uber-no-cars-available [https://perma.cc/JG95-CZNK] (last visited Mar. 28, 2025).

146. *See I Can't Request a Ride*, UBER, https://help.uber.com/en/riders/article/i-cant-request-a-ride?nodeId=9a234cb2-60d6-428c-aa67-0458bfaef081 [https://perma.cc/MF6P-XRYU] (last visited Mar. 28, 2025).

147. *See* Nicole Lee, *Online Grocery Deliveries Are Facing an Unprecedented Stress Test*, ENGADGET (Mar. 30, 2020), https://www.engadget.com/2020-03-30-coronavirus-online-grocery-delivery.html [https://perma.cc/JP4W-JCWP].

148. *See id.*

149. *See* Suresh Kotha & Sandip Basu, *Amazon and eBay: Online Retailers as Market Makers*, *in* THE MARKET MAKERS: HOW RETAILERS ARE RESHAPING THE GLOBAL ECONOMY 155, 164–65 (Gary G. Hamilton, Benjamin Senauer & Misha Petrovic eds., 2011).

150. *See* Aaron Brown, *How to Get Those Concert and Gig Tickets that Sell out in Seconds*, EXPRESS (Apr. 22, 2016, 10:18 AM), https://www.express.co.uk/life-style/science-technology/663433/How-to-Concert-Gig-Tickets-Easy-Auto-Refresh-Sell-Out [https://perma.cc/B5YS-ACYY].

151. Kim Bhasin, Jordyn Holman, Tiffany Kary & Gabrielle Coppola, *U.S. Holiday Sales Are Booming, Just Not in Stores*, BLOOMBERG (Dec. 1, 2020, 5:00 PM UTC), https://www.bloomberg.com/news/articles/2020-12-01/black-friday-shopping-moves-online-for-covid-could-be-a-record-in-u-s [https://perma.cc/E969-DG92]. Moreover, retailers now do more business on Cyber Monday than they do on Black Friday, further virtualizing Black Friday lines. *See* Tatiana Walk-Morris, *Black Friday to Cyber Monday US Retail Sales to Hit 'Record' $75B*, RETAIL DIVE (Oct. 4, 2024), https://www.retaildive.com/news/consumer-spending-record-black-friday-cyber-monday-report/728916 [https://perma.cc/E969-DG92]. The author thanks the UCLJ editorial team for drawing his attention to this change.

152. Peter S. Goodman & Niraj Chokshi, *How the World Ran Out of Everything*, N.Y. TIMES (Oct. 22, 2021), https://www.nytimes.com/2021/06/01/business/coronavirus-global-shortages.html [https://perma.cc/HZE3-S2QL].

153. *See* VARIAN, *supra* note 26, at 8.

and find that a product has sold out must do the waiting. These will likely be different groups of people. The slow and the poor are not always the same. But some people will always be forced to wait.

The efficiency of selling out in the information age should dispel any concerns that embrace of selling out in the information age will lead to a Soviet-style world of lines-around-the-block to access necessities.[154] There is also an important difference between the *cause* of lines in the Soviet Union and the unexpected surge in demand that forces a firm to ration by selling out. Lines were long in the Soviet Union not only because there was no information technology to allow people to shop from home but, more importantly, because the Soviet Union subsidized prices, meaning that prices were below cost.[155] In the Soviet Union, shortages arose because the government pushed prices below the capacity of producers to satisfy demand, and kept them there permanently, so shortages were not the temporary consequence of an unexpected surge in demand, but rather a permanent consequence of long-term government policy.[156] It was not unexpected surges in demand, but rather expected excesses in demand relative to supply at below-cost prices that created shortages and lines in the Soviet Union.[157] Under the surge pricing ban proposed in this Article, the firm retains the power to choose its own price, and a firm will always choose a price that covers its costs. So long as the government does not embrace a policy of enforced below-cost pricing, shortages will continue to exist only because demand has surged unexpectedly (or, equivalently, because supply has unexpectedly fallen short), not because, as in the Soviet Union, planners have forced firms to choose below-cost prices that cause expected levels of demand to outstrip supply.[158]

Because, under the proposed surge pricing ban, firms would retain the power to charge prices that cover their costs, selling out would also not reduce incentives to invest, as the kind of selling out that took place in the Soviet Union might have done.[159] Investors in the Soviet Union expected to be compelled to charge below-cost prices, so they did not invest. Investors who expect not to be able to charge a surge price in response to an unexpected surge in demand can still expect to be permitted to charge the pre-surge price that covers their costs. They would have chosen that pre-surge price to include a return on their

154. *See* JÁNOS KORNAI, THE SOCIALIST SYSTEM: THE POLITICAL ECONOMY OF COMMUNISM 228–45 (1992).

155. *Id.* at 229, 273 ("Unless lucky, [a customer's] shopping is not a single action but a process, a sequence of decisions . . . . [E]vent 1, beef is available, but customers must queue for it. This is a familiar occurrence; under classical socialism customers very often have to queue. For some goods there is an actual, 'physical' queue at the counter or outside the store . . . . [T]he good [one] seeks may not be available at all, either immediately or after queuing. In that case [the customer] must choose from a further set of alternatives.").

156. *See id.* at 273; Lindsay & Feigenbaum, *supra* note 134, at 405.

157. *See* KORNAI, *supra* note 154.

158. *See id*.

159. *See id.*

investment sufficient to make them willing to invest. So they would continue to have an incentive to invest.

Unlike the shortages of the Soviet Union, the shortages due to unexpected demand surges at issue in this Article necessarily appear in any economy, because they result not from poor planning but from the inability fully to predict the future.[160] These shortages are perhaps more often hidden in capitalist economies because they can be covered up with price increases designed to ration access to the good in short supply using price instead of the "sold out" notice.[161] But these shortages are just as real and pervasive in the contemporary American economy as they would be were rationing always to be implemented through selling out.[162] Thanks to the internet, these shortages can now be addressed without either the regressive distributive effects of rationing with price, or the pain of waiting.[163]

Not only does selling out no longer carry a time cost relative to surge pricing, but it may even have a cost advantage relative to surge pricing because, unlike surge pricing, selling out costs nothing to implement.[164] To sell out of a product entails no more than the cost of listing the product as sold out on its product webpage. To engage in surge pricing requires the acquisition of the information technology required to adjust prices quickly in response to changes in demand.[165] In particular, surge pricing requires investment in the acquisition of a piece of information that a firm that sells out does not require: the price that will actually attract only so much demand as can be satisfied by existing supply.[166] If the firm chooses a price that is too low, the firm will leave money on the table. If the firm chooses a price that is too high, the firm could potentially make a loss.[167] To find the right price, the firm must know enough about the distribution of willingness to pay among consumers to pick the "cutoff price that separates the wealthy few who should" take under this rationing system "from those who should not."[168] That requires data and processing power that the act of selling out does not require.[169] Indeed, it is an indication of the relative costlessness of selling out that surge pricing often devolves into selling out

160. *See* Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52.

161. *See id.*

162. *See id.*

163. *See* Woodcock, *supra* note 47, at 55.

164. This paragraph is a substantially reworked version of a paragraph that first appeared in my previous paper. Ramsi A. Woodcock, *The Efficient Queue and the Case Against Dynamic Pricing*, 105 IOWA L. REV. 1759, 1792 (2020). Portions of two sentences are direct quotes. Those sentences are noted *infra* in footnotes.

165. *See* Lynn DeLain & Edward O'Meara, *Building a Business Case for Revenue Management*, 2 J. REVENUE & PRICING MGMT. 368, 370 (2004) (estimating that setting up a "revenue management" system costs between $3 million and $10 million).

166. *See* STEVEN ORLA KIMBROUGH, AGENTS, GAMES, AND EVOLUTION: STRATEGIES AT WORK AND PLAY 193–98 (2011).

167. *See id.*

168. *See id.* Part of this sentence appears verbatim in Woodcock, *supra* note 164, at 1792.

169. *See* DeLain & O'Meara, *supra* note 165, at 370.

because of the difficulty of implementing an effective surge pricing system. A firm trying to engage in surge pricing while minimizing information costs may start to sell at a very high price and then lower the price "bit by bit until all inventory has sold, but unless those increments are very small, and all potential buyers are ready to purchase at the same time," the firm "may overshoot, reducing price too far" and "leading to an excess of demand that must be resolved in the end by" selling out.[170] Thus, the additional information requirement causes surge pricing to shade into the simpler system of rationing based on antecedence. Another way in which surge pricing can shade into selling out will be considered in the next Part.

C. SURGE PRICING ALLOCATES

The third objection to prohibiting surge pricing is that surge pricing allocates goods to those who value them the most.[171] Because economies generate the most surplus when they allocate goods to those who place the highest value on them, it follows that surge pricing is efficient and therefore should not be banned.[172]

One problem with this argument is that antitrust is not concerned with efficiency—with maximizing total surplus—but rather with the welfare of consumers—with maximizing consumers' share of the surplus.[173] Whether surge pricing does good and should be protected therefore depends not upon whether surge pricing increases the size of the pie, but upon whether surge pricing increases the size of consumers' slice of the pie.[174] The fact that surge pricing increases the size of the pie by raising prices, an act that redistributes wealth from consumers to firms at the same time that it determines who can and cannot receive them, implies that surge pricing transfers at least some of any increase in total surplus that it brings about through its allocative effects to firms. If the amount transferred is large enough, it is possible that consumers might be better off under a less perfectly allocative rationing system that leaves them a larger share of a smaller pie.[175]

A comparison of the grey areas in Figure 13 and Figure 14 provides an example. In Figure 13, the surge price allocates the product to the consumers who have the highest willingness to pay (those at the highest point of the demand line).[176] However, most of the value created thereby is appropriated by the firm

170. *See* KIMBROUGH, *supra* note 166. Part of this sentence and the next appears verbatim in Woodcock, *supra* note 164.

171. *See* VARIAN, *supra* note 26, at 15–17.

172. *See* BAUMOL, *supra* note 63, at 498.

173. Kirkwood & Lande, *supra* note 27.

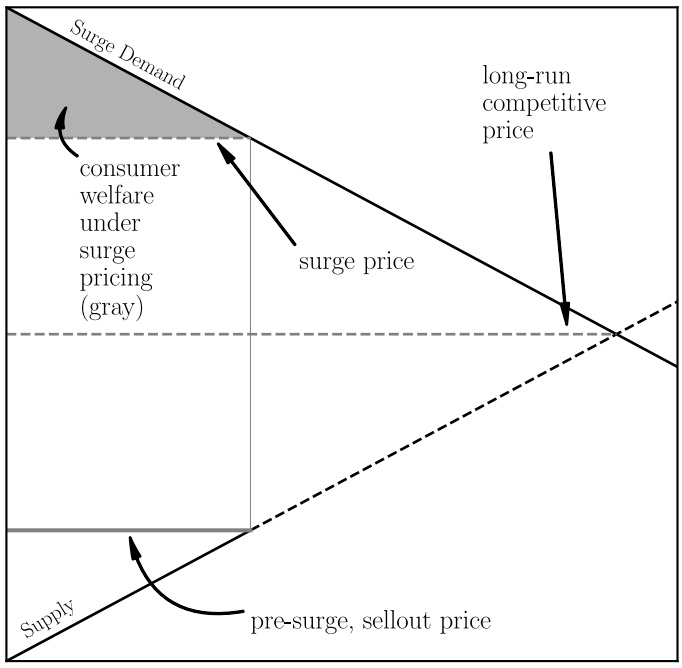
174. *See id.*

175. *See* VARIAN, *supra* note 26, at 249–50.

176. The practice of measuring surplus as the area under a demand line assumes that willingness to pay—which is represented by the demand line—is a perfect proxy for value. *See* BAUMOL, *supra* note 63, at 498. It is

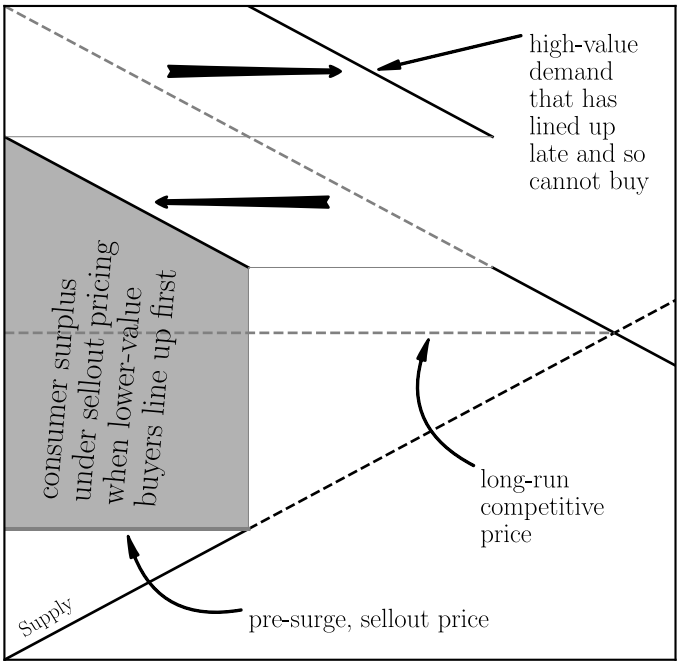
through the high surge price, leaving only the small grey triangle of surplus for consumers. By contrast, in Figure 14, sell-out pricing enables consumers with the lowest willingness to pay to obtain the product by making their purchases before the high willingness to pay consumers are able to do so. If we assume that willingness to pay is a good proxy for the value a consumer places on a good, then the sell-out pricing depicted in Figure 14 is less efficient than the surge pricing depicted in Figure 13. The total area above the supply line and below the demand line of the consumers who buy in Figure 13—which gives the total surplus created by surge pricing—is larger than the total area above the supply line and below the demand line of the consumers who buy in Figure 14, which gives the total surplus created by sell-out pricing. But, even so, the low sell-out price in Figure 14 ends up creating more surplus for consumers—represented by the large grey trapezoid—than does the surge price in Figure 13, which creates only the small grey triangle of surplus for consumers. Thus, sell-out pricing can make consumers better off even if it does a worse job than surge pricing at allocating goods to those who value them the most.

FIGURE 13



for this reason that the graphical treatment in Figure 12 and Figure 13 is appropriate to examination of the consumer welfare effects surge pricing under the assumption that surge pricing does a perfect job of allocating products to those who value them the most. *See supra* Subparts.III.B, III.C.

FIGURE 14



Another problem with the allocation objection is that there is no basis for supposing that high prices do a better job of allocating goods than selling out. High prices allocate effectively only to the extent that willingness to pay, which is the criterion according to which high prices determine who can buy and who cannot, is a good proxy for the value that a consumer places on a good.[177] It certainly is reasonable to suppose that some people are willing to pay more for a good because they place a higher value on it than those who are willing to pay less.[178] But it is equally reasonable to suppose that some people are willing to pay more for a good because they are rich, rather than because they place a higher value on the good than those who are willing to pay less for it.[179] Money has less value to the rich than it does to the poor because the rich have more of it. It follows that a rich man may be willing to pay more for a good than a poor man even if the poor man places a higher value on the good.[180] We understand this point so intuitively that, in daily life, we are as likely to say that we do not wish to buy something because it is too expensive (reflecting our unwillingness to pay for it) as we are to say that we do not wish to buy it because we cannot

177. *See* VARIAN, *supra* note 26, at 17.

178. *See id.*

179. *See* EUGENE SILBERBERG, THE STRUCTURE OF ECONOMICS: A MATHEMATICAL ANALYSIS 396–402 (2d ed. 1990); VARIAN, *supra* note 26, at 141–42; BAUMOL, *supra* note 63, at 498–500.

180. *See* BAUMOL, *supra* note 63, at 501.

afford the thing. Our appeal to affordability suggests that financial constraints are preventing us from fully expressing the level of value we place on the good through our willingness to pay for it. It follows that price may allocate as much based on wealth as it does based on actual value.[181]

Selling out, which employs antecedence as its proxy for value, is a similarly flawed means of allocating goods to those who value them the most.[182] It is certainly reasonable to suppose that some of those who arrive first to purchase a product do so because they place a higher value on the product than those who arrive later. Moreover, it is easy to imagine that some of those who arrive first might be buyers whose poverty would otherwise have prevented them from buying the product if high price were used as a rationing device. But it is equally reasonable to suppose that some of those who arrive first do not actually place a higher value on the good than those who arrive later.[183] Early risers, the fleet of foot, or those who are handy at computers might be the first to buy thanks to talents that give them an advantage in a system of rationing by antecedence despite their placing no special value on the good.[184] In the race to buy, they might well beat out those who place a higher value on the good.[185] It follows that antecedence may allocate as much based on a talent for making quick purchases as it does based on the actual value people place on goods.

If both proxies for value—willingness to pay and place in line—are flawed, then which is better at allocating products to those who value them the most? The answer is unclear, and so allocative efficiency cannot serve as a basis for preferring surge pricing over selling out.[186]

D. SURGE PRICING IS INEVITABLE

It is sometimes argued that rationing with price is preferable to selling out because selling out inevitably devolves into rationing with price, making rationing with price inevitable whether it is prohibited or not.[187] This is an argument about the allocative consequences of banning surge pricing. The argument is that banning surge pricing will not succeed at rationing access to the

181. *See id.* at 501–02. One might argue that if the economy doles out wealth as a reward to those who have worked hard to make society better, then any allocative losses to consumers associated with rationing through high prices might be more than offset by the incentive effect of wealth on the productivity of the rich and those who aspire to be rich. It is far from obvious, however, that most wealth is gained as part of such a reward mechanism.

182. *See* Barzel, *supra* note 134, at 73.

183. *See id.* (arguing that because the poor have a lower "time-cost" they have an advantage in a queue-based system of rationing).

184. *See* Eric Budish, Peter Cramton & John Shim, *The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response*, 130 Q.J. ECON. 1547, 1548–49 (2015).

185. *See* Barzel, *supra* note 134, at 73.

186. *See* Woodcock, *supra* note 47, at 52.

187. *See* Stewart, *supra* note 42 ("If you keep prices low, people will buy tickets and resell them on the secondary market. Someone is going to pay a market-clearing price, no matter how high."); Deacon & Sonstelie, *supra* note 28, at 645–46; *see, e.g.*, W. KIP VISCUSI, JOSEPH E. HARRINGTON, JR. & JOHN M. VERNON, ECONOMICS OF REGULATION AND ANTITRUST 684–87 (4th ed. 2005).

good based on place in line because the rich will buy their way to the head of the line. If a rich person encounters a sold-out sign, he will respond by offering to buy the good from original purchasers at a premium. In this way, every person with a high willingness to pay who would have purchased the good under surge pricing will purchase it under a regime of selling out. Rationing based on antecedence fails.[188] While selling out and rationing with price producer the same allocative results, the argument goes, they are not equally desirable. Under a regime of selling out, the rich must incur costs in order to buy their way to the head of the line. They must create resale markets that allow them to buy goods from original purchasers. Surge pricing avoids these costs and is therefore more efficient.

The argument that selling out inevitably devolves into rationing with price is almost certainly overstated, however, precisely because resale is costly. The cost of resale prevents the rich from buying their way to the head of some lines. If the information age had brought about perfect devolution, there would be a resale market for every item that sells out—a Stubhub for everything from eggs to toilet paper.[189] Those do not exist. It follows that a regime of selling out has different allocative consequences in comparison with a regime of rationing with price. If the allocation produced by selling out creates more value for consumers than the allocation produced by rationing with price (and that is possible, as we saw in Subpart III.C), the gain to consumers from a regime of selling out might justify, in the view of consumers, any costs to the rich associated with buying their way to the head of lines in markets in which it is possible for them to do that. Moreover, bans on resale could be used to preclude such waste and achieve consumers' preferred allocation. For example, airlines have been highly effective at banning the resale of tickets by associating each ticket with its original purchaser and allowing only the original purchaser to use the ticket.[190] Such product personalization itself has a cost, but information technology is reducing it.[191]

Even if it were true that selling out always devolves into rationing with price, there are distributive consequences of such devolution that benefit consumers and may offset, from the perspective of consumers, any cost to the rich of buying their way to the head of the line. Under surge pricing, the rich pay surge prices to the firm. Under a regime of selling out, however, they pay the equivalent of surge prices to those consumers who managed to get in line first

188. *See* N. Gregory Mankiw, *I Paid $2,500 for a 'Hamilton' Ticket. I'm Happy About It.*, N.Y. TIMES: UPSHOT (Oct. 21, 2016), https://www.nytimes.com/2016/10/23/upshot/i-paid-2500-for-a-hamilton-ticket-im-happy-about-it.html [https://perma.cc/U4VY-U6SW] ("High prices are a natural reflection of great demand and scant supply. In a free market, in which private individuals can engage in mutually advantageous gains from trade, they are inevitable until demand subsides or supply expands.").

189. Ali B. Mondt, Yohan Lee, Stephen L. Shapiro & Alan Morse, *Consumer Perceptions of a Secondary Ticket Market: The Case of StubHub and Major League Baseball*, 24 INT'L J. SPORTS MKTG. & SPONSORSHIP 1039, 1039–40 (2023).

190. Ramsi A. Woodcock, *Personalized Pricing as Monopolization*, 51 CONN. L. REV. 311, 337–38 (2019).

191. *Id.*

and purchase the good. The profits that a firm would have generated under surge pricing are therefore redirected to those consumers who got in line first. Since shareholders tend to be richer than consumers, the result is likely to be a transfer of wealth from rich to poor. Moreover, this transfer compensates the consumers who would have taken under a regime of selling out for their loss of access to the good as a consequence of the rich buying their way to the head of the line. No consumer will give up her place in line without being paid more than the money value she places on the good. If the allocation produced by selling out creates more value for consumers than the allocation produced by rationing with price, the consumer may not receive adequate compensation because, in that case, the money value the consumer places on a good will not accurately reflect the actual value that the consumer places on the good. But the consumer will still receive some degree of compensation because the consumer will not give away her place in line for free. By contrast, under surge pricing, consumers who cannot afford to pay surge prices and hence do not gain access to the good receive no compensation for the denial. They simply must do without. Banning surge pricing gives consumers who take by antecedence a property right in the good and hence a right to profit from attempts by the rich to reinstitute rationing with price by buying their way to the head of the line.

E. THE COMING ALTERNATIVES TO SELLING OUT

The information age is making it easier for firms directly to identify desire and route supply to satisfy it, and so is likely to give birth to additional approaches to rationing access to goods in short supply. These approaches will be as good at avoiding lines and other dislocations, and as good at allocating goods to those who want them the most, as surge pricing or selling out are today. The emergence of each new form will weaken the argument for surge pricing even further. Consider, for example, the problem of downtown parking. Traditionally, city governments have responded to surges in demand for parking spots by letting them sell out. Municipal parking meters charge a fixed price for parking and do not raise that price when demand surges, so the inventory of parking spots is effectively rationed based on antecedence: whoever first arrives at the spot parks. This results in terrible dislocation and waste—studies show that 30 percent of downtown driving is spent looking for parking spots. That could be avoided through implementation of surge pricing via parking meters. A more consumer-friendly approach would be to apply technology to eliminate the cost of rationing based on antecedence. Cities could adopt an online reservations system—that is, an efficient queue—for parking spots.[192]

192. Paul Barter, *Is 30% of Traffic Actually Searching for Parking?*, REINVENTING PARKING (Oct. 7, 2013), https://www.reinventingparking.org/2013/10/is-30-of-traffic-actually-searching-for.html [https://perma.cc/43VL-26YS]. One San Francisco startup tried to implement surge pricing for public parking spots before being shut down by the city. *See San Francisco Puts the Brakes on a Parking App Startup*,

But there is a third way. Imagine that, rather than simply allow users to reserve spots, the online reservations system were to prioritize access to spots based on a user profile which might include information about the reason for which the user wishes to park downtown and the driver's safety record.[193] Someone traveling to access government services and having a clean driver safety record might receive a spot. A joyrider might not. This would represent a different approach to rationing because it would be based neither on willingness to pay nor, entirely, on place in line. But, depending on the quality of the user profiles, such a system might do just as good a job of allocating access to those who need it the most as would either surge pricing or online queuing. Cities might also use such a profile-based system to ration access to congested downtown streets, creating an alternative both to surge pricing (called congestion pricing in this context) and selling out (i.e., capping the number of vehicles admitted downtown).[194] Thus surge pricing will become just one among many ways efficiently to ration access during shortages.

IV. BROADER APPLICABILITY

A. INTRAMARKET RESALE (INCLUDING SECURITIES AND COMMODITIES TRADING) AND PRICE GOUGING

1. Intramarket Resale

The case against surge pricing has broader applicability than might at first appear. It not only applies to consumer goods—the primary context in which it has been developed so far in this Article—but to any good that cannot be produced as quickly as its price can be changed.[195] One important example is "intramarket resale", in which buyers resell goods into the same market in which they purchase them. Intramarket resellers are also known as "speculators," particularly when they trade in securities or commodities on centralized exchanges.[196]

Intramarket resellers that use algorithms to increase prices in response to surges in demand engage in surge pricing and violate the per se rule against

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YAHOO!FINANCE (June 24, 2014), https://finance.yahoo.com/news/san-francisco-puts-brakes-parking-182500136.html. The app would have undermined San Francisco's policy of selling out by sending employees to hold spots and then selling the spots at a premium; thus, a regime of selling out would have devolved into rationing with price in this case.

193. *See* Trista Lin, Hervé Rivano, & Frédéric Le Mouël, *A Survey of Smart Parking Solutions*, 18 IEEE TRANSACTIONS ON INTELLIGENT TRANSP. SYS. 3229, 3229 (2017).

194. *See* Ramsi Woodcock, *Congestion Pricing Is Class Warfare. Here's a Better Idea*, OZY (Mar. 31, 2019), http://www.ozy.com/immodest-proposal/congestion-pricing-is-class-warfare-heres-a-better-idea/93503 [https://perma.cc/DVA4-EUVN].

195. *See supra* note 49 and accompanying text.

196. For more on speculation, see *infra* Subpart.IV.B.2. For an example of resale within the same market that is not meant to generate a surge profit, see *supra* text accompanying note 197.

surge pricing under Section 2 of the Sherman Act proposed in this Article. Intramarket resellers meet the basic requirement for surge pricing liability that they are always able to raise prices faster than they can increase production because resellers are incapable of ever really increasing output, much less increasing it at the same speed with which they raise prices. A reseller can acquire its inventory only by purchasing it on the same market in which the reseller sells the inventory. Thus, in order for a reseller to bring additional supply to market to satisfy a surge in demand, the reseller must buy more of the good on the same market. That effectively increases the surge in demand to the same extent as the firm seeks to increase supply. As a result, the firm makes no progress toward its goal of offsetting the surge in demand with additional supply.[197]

In general, intramarket resale should not be profitable because the original seller should be able to exploit the same profit opportunities that resellers seek to exploit. Original sellers should be able to engage in surge pricing themselves, so resellers should not be able to find any low-price inventory from which they can profit during a shortage via resale at high prices. But original sellers are sometimes unable to exploit profit opportunities when demand surges. This will be the case for inventory purchased by resellers before demand surged. Because demand surges are by definition unexpected, original sellers will not have sold any inventory purchased by resellers in advance at the high prices made possible by the surge.

Resellers may also simply choose to forego profit opportunities during a demand surge by charging sell-out prices rather than surge prices.[198] Firms may do that out of a sense of moral obligation to consumers or to avoid alienating consumers by visibly exploiting them during temporary surges in demand.[199] Or

197. Thus, a plaintiff in a case against an intramarket reseller need only define a relevant market and show that the defendant both buys and sells in that market in order to satisfy the requirement of proof that the defendant can increase price faster than supply. The inability of a reseller to expand supply is unique to the intramarket resale context. By contrast, a firm that buys goods in one market to resell them in another market does expand supply in the destination market by introducing into it goods that had been in the other market.

198. Outside of the demand surge context, intramarket resale can also be profitable when used to arbitrage a firm's attempt to personalize prices. *See* Woodcock, *supra* note 124, at 323, 333–34. Resellers buy up, at low prices, the inventory that the firm sells to some buyers at low personalized prices and then resell it at a slight discount on the high prices that the firm would personalize to other buyers, thereby turning a profit. *Id.* In contrast to intramarket resale directed at sell-out pricing during a surge, which, like all surge pricing, weakens the effects of pre-surge competition, this arbitrage is procompetitive conduct in that it prevents the firm from maintaining high personalized prices, and so undermines the entire personalized pricing scheme; the resellers effectively compete with the firm in the sale of inventory to the buyers to whom the firm would target high prices. *Id.* It follows, I have argued in another article, that attempts by firms to prevent intramarket resale in this context are anticompetitive and violate Section 2 of the Sherman Act. *Id.* at 324–25.

199. *See* Utpal M. Dholakia, *If You're Going to Raise Prices, Tell Customers Why*, HARV. BUS. REV. (June 29, 2021), https://hbr.org/2021/06/if-youre-going-to-raise-prices-tell-customers-why [https://perma.cc/VFE7-YWAB] ("When performed poorly, the news [of a price hike] can lead to undesirable outcomes like customer complaints, social media outrage, and even worse, having to walk back the price increase, or losing customers altogether."); *see, e.g.*, Mankiw, *supra* note 187 (lamenting the fact that, out of apparent respect for its audience, the show Hamilton does not charge the maximum possible surge prices).

firms may simply wish to invest elsewhere the funds needed to set up a surge pricing system. In such cases, the intramarket reseller can then swoop in, buy up the firm's inventory at the low sellout price and then resell it into the same market at surge prices, turning a profit. For consumers, the effect is to transform a market characterized by sellout pricing into one characterized by surge pricing, only now the firm appropriating the profits associated with surge pricing is the reseller, rather than the firm that produced the goods. In these markets, resale results in the devolution of a shortage regime into a surge pricing regime discussed in Subpart III.D. The event ticket market is a good example. In 2016, the hit Broadway show Hamilton pledged not fully to exploit its power to charge surge prices, allowing its tickets to sell out instead.[200] But scalpers bought up seats at the below-surge prices and resold them at higher surge prices, frustrating the show's plans. The result was that consumers still paid high prices, but resellers, rather than the show, profited.[201] As the example of ticket scalping suggests, surge pricing by intramarket resellers is a major threat to firms that choose voluntarily to forgo surge pricing themselves. Intramarket resale forces firms that want to avoid surge pricing to embrace it lest they fail to cash in on consumer harm that they are no longer able to prevent.

The applicability of the proposed rule against surge pricing to intramarket resale has important implications.[202] It follows immediately from it that algorithmic ticket scalping should be per se illegal and, more generally, that any attempt by a reseller to use algorithms to undermine a firm's policy of selling out should be per se illegal. Startlingly, it follows as well that algorithmic securities and commodity speculation should be per se illegal when the speculation is carried out on a single, centralized exchange. Securities and commodities speculators buy in the same centralized securities or commodities markets in which they sell, which makes them intramarket resellers. Moreover, if they use algorithms to pick their prices, they engage in surge pricing. They buy low and hope that an unexpected surge in demand will allow them to sell high. Indeed, a speculator's business model can only be to exploit demand surges to charge high prices because the speculator buys the security or commodity at the market price and so the speculator's cost of production, exclusive of any return on its investment, is the pre-surge price itself. It follows that the speculator cannot[203] generate income unless an unexpected shift in demand makes it

200. *See, e.g.*, Mankiw, *supra* note 187 (arguing that it is a shame that the Broadway show Hamilton did not engage in more vigorous surge pricing, thereby allowing resellers to capture the profits that the show could have earned).

201. *See, e.g.*, *id.*

202. *See supra* Subpart.II.C.2. The case against surge pricing in the intramarket resale context is even stronger than the case against surge pricing in general because there can be no doubt that the surge price is unnecessary to cover production costs if the original producer was willing to sell the inventory to the reseller at the low sellout price.

203. There is one exception: intramarket resellers can generate income by arbitraging an attempt by the original seller to personalize prices. *See supra* note **Error! Bookmark not defined.** and accompanying text.

possible for the speculator to charge a higher price.[204] If the demand shift were expected, then the speculator's suppliers would charge a premium to the speculator to appropriate from the speculator any profits that the speculator might otherwise generate from the extra demand.[205] The radicalism of the result that algorithmic securities and commodities speculation are per se illegal reflects no more than the fact that any income won by serving as a middleman between the same two markets is necessarily redistributive in character, as the middleman produces nothing other than the act of buying low and selling high and hence has no genuine production costs with which to justify any price increases; carrying this out with algorithms only magnifies the redistribution.[206]

Surge pricing by intramarket resellers, whether in the securities and commodities markets or other markets, is a particularly pernicious form of surge pricing for two reasons. First, the activity of intramarket resale is itself costly; the trader or scalper incurs administrative costs in buying and selling, but produces nothing other than a redistribution of wealth either from producers to resellers (if producers would have engaged in surge pricing had they not sold to resellers) or from consumers to resellers (if producers would not have engaged in surge pricing had they not sold to resellers). That makes the administrative costs of reselling count as pure economic waste.[207] Second, one might believe that producers deserve the surge profit more than intramarket resellers do because producers actually produce the product that consumers buy. That is, producers are responsible for creating the value to consumers that ultimately makes consumers willing to pay surge prices. Intramarket resellers are not responsible for that value, and so it seems unjust to allow them to appropriate a substantial portion of it.[208] It is important, however, not to take this argument too far. The surge profits that resellers appropriate are surplus, which, by definition, is the excess of value created for consumers over the value's cost of production, and so surge profits are not strictly necessary to make producers

204. By contrast, the original seller will build a reasonable return on investment into the pre-surge price that the seller chooses, otherwise the seller would not choose that price. So, the original seller does not need an unexpected shift in demand in order to generate income.

205. *See supra* Subpart.II.D.

206. This is equally true for intramarket resale that arbitrages personalized pricing. *See supra* note **Error! Bookmark not defined.** and accompanying text. However, to the extent that such arbitrage undermines attempts to redistribute wealth on a grand scale via personalized pricing, it may be considered a comparatively benign form of intramarket resale.

207. *See* Gordon Tullock, *The Welfare Costs of Tariffs, Monopolies, and Theft*, 5 W. ECON. J. 224, 232 (1967).

208. By contrast, intermarket resellers do produce something, such as physical transport of goods from one market to the other or information that helps buyers in one market find products in the other. *See* Donald J. Boudreaux, *The Middleman Serves an Essential Economic Function*, DAILY ECON., (Sept. 3, 2019), https://thedailyeconomy.org/article/the-middleman-serves-an-essential-economic-function [https://perma.cc/9YJT-KBM5] ("Wholesalers specialize in transporting goods from around the country, or even the world, and assembling these in accessible, central locations at which retailers' delivery trucks can be loaded."). For this reason, intermarket resale is, in general, a good thing.

ready, willing, and able to produce.[209] It follows that producers do not really need those profits any more than do resellers. But if someone other than consumers is to take the profits, it would seem more just for the firm that created the surplus through productive activities to take them rather than for the firm that merely bought low and sold high to take them.[210] For these reasons, application of Sectio 2 of the Sherman Act to prohibit surge pricing by intramarket resellers is particularly appropriate.

2. Price Gouging

The case for antitrust liability for surge pricing developed in this Article also applies to a great deal of algorithmic pricing that is currently prohibited by state laws against price gouging, as well as to a great deal of algorithmic pricing that fits a reasonable economic definition of price gouging but which today is not covered by state price gouging laws.[211] That is because surge pricing, as I have defined it in this Article, is price gouging with algorithms. A reasonable economic definition of price gouging is that it is the charging of high prices to ration access to a good that is in shortage due to an unexpected surge in demand.[212] Indeed, the public reserves a special level of contempt for price gouging precisely because the unexpectedness of the demand surge that gives rise to price gouging allows the public to infer that the price increase is not required to cover costs but instead represents a brazen attempt to redistribute at the public's expense.[213] This definition of price gouging is captured by the requirements of the test for surge pricing proposed in this Article that the firm experience a surge in demand, increase its prices in response, and do so faster than the firm can increase supply. The final requirement of the proposed surge pricing test, that the firm use algorithms to increase prices, transforms price gouging into surge pricing. Given that surge pricing is in effect a subcategory of price gouging, it should be no surprise that a ban on surge pricing would partially overlap with existing price gouging laws.

State price gouging laws generally attack only a small subset of price gouging conduct, however, because they generally apply only to the pricing of goods classified as necessities. They also generally apply only to periods when the state has declared an emergency, and states do not always declare an emergency whenever there is a surge in demand.[214] The proposed per se rule

209. *See* BAUMOL, *supra* note 63, at 593.

210. *See* BARBARA H. FRIED, THE PROGRESSIVE ASSAULT ON LAISSEZ FAIRE: ROBERT HALE AND THE FIRST LAW AND ECONOMICS MOVEMENT 74–75 (1st ed. 1998) ("[R]ent-theory Lockeanism. . . . [theorized that] [i]ndividuals had a moral right only to that portion of income that compensated them for the costs of production; any unearned surplus above that amount was the moral property of the community, which it could appropriate and redistribute as it chose.").

211. *See* Woodcock, *supra* note 47, at 53–55.

212. *See supra* Subpart.II.C.2; Woodcock, *supra* note 47, at 51–53.

213. *See id.*

214. *See id.* at 51, 57; Woodcock, *The Economics of Shortages*, *supra* note 52.

against surge pricing would effectively leverage the antitrust laws greatly to expand the ambit of prohibitions on price gouging, although only with respect to cases in which prices are increased algorithmically. For example, the proposed rule would have meant that any attempt by Amazon to engage in price gouging with respect to pandemic-related items in 2020 would have violated the antitrust laws, even with respect to products not typically considered necessities by state price gouging statutes, and even for sales in states that had not declared an emergency.[215] Amazon's surge pricing of hand sanitizer would, for example, have been prohibited, even though many state price gouging laws do not cover cleaning supplies.[216]

B. BEYOND ALGORITHMIC PRICING

1. Toward a Blanket Ban on All Price Gouging, Including Non-Algorithmic Price Gouging

Price gouging and surge pricing harm consumers in the same way: they increase prices above costs in response to unexpected surges in demand. One might therefore wish to condemn price gouging, including both algorithmic price gouging (i.e., surge pricing) and non-algorithmic surge pricing, under Section 2 of the Sherman Act instead of condemning surge pricing alone. That would be difficult, however, because, absent the use of algorithms, there is no act to condemn apart from the raising of prices itself, and the courts have long refused to treat the raising of prices alone as an antitrust violation.[217] As noted in the previous Subpart, state price gouging laws cover some non-algorithmic price gouging in the emergency context. But unexpected surges in demand are a pervasive part of economic life even outside of the emergency context, and firms often raise prices in response.[218] This conduct remains completely unregulated. For example, many residential home sale transactions meet the definition of price gouging. A homeowner who puts his house up for sale at one price, only to find that demand is so strong that buyers are willing to bid higher prices, faces an unexpected surge in demand.[219] If the homeowner accepts the highest bid, rather than simply selling the house to the first comer willing to pay the homeowner's initial listing price, then the homeowner engages in price gouging and harms consumers, even though the homeowner uses no pricing algorithms to bring about this result and so technically has not engaged in surge pricing.[220]

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215. *See* Woodcock, *supra* note 47, at 57; Woodcock, *The Economics of Shortages*, *supra* note 52.

216. *See, e.g.*, Walser, *supra* note 47; IND. CODE ANN. § 4-6-9.1-2 (West 2025) (limiting price gouging restrictions to fuel).

217. *See* Verizon Commc'ns Inc. v. Law Offs. of Curtis V. Trinko, LLP, 540 U.S. 398, 407 (2004) ("The . . . charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system.").

218. *See supra* Subpart.III.B; Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52.

219. *See, e.g.*, Woodcock, *supra* note 47, at 58.

220. *Id.*

The listing price is the price at which the homeowner was willing to sell, which implies that it was sufficient to cover the homeowner's costs; to accept a higher bid is, therefore, to charge an above-cost and hence consumer-harmful price.[221]

Given the harmfulness of price gouging, Congress should act to ban price gouging as a general matter, whether the price increases are implemented algorithmically or not. Because such a prohibition would apply to all price increases that outstrip the ability of the firm to increase output in response to a surge in demand, not just those implemented algorithmically, it would create a blanket obligation in firms—and homeowners—to stick to pre-surge prices whenever they encounter an unexpected surge in demand, at least until firms offer for sale any additional output that they produce in response to the surge. Implementation of a general, standalone prohibition on price gouging, including price gouging that does not employ algorithms, would be potentially more difficult than implementing a prohibition on surge pricing via the antitrust laws, however, because evidence that price has increased in response to an unexpected surge in demand may be difficult to find in cases in which defendants did not use algorithms.[222] That is, evidence that an algorithm was programmed to increase prices in response to data suggesting a surge in demand would be sufficient for liability under the proposed antitrust ban on surge pricing, but such evidence would necessarily be lacking in cases in which the firm did not use algorithms to identify a demand surge.[223] In such cases, some other form of documentation of the firm's decision-making process with respect to the increase in price would be required.[224]

2. Implications for Theories of Securities and Commodities Trading

Much of securities and commodities speculation is already executed using algorithms. As a result, much of securities and commodities speculation is already covered by my proposed antitrust prohibition on algorithmic surge pricing, as discussed in Subpart IV.A.1. A broader ban on price gouging, both algorithmic and non-algorithmic, would put an end to all securities and commodities speculation, at least in principle.[225]

Defenders of speculation argue that it facilitates "price discovery", meaning that it ensures that the prices of securities or commodities accurately reflect the value placed upon them by buyers.[226] This is really just the signaling

221. *Id.*

222. *Cf.* Woodcock, *supra* note 124, at 331–32 (observing that the use of algorithms to implement personalized pricing makes personalized pricing easy to identify).

223. *See supra* Subpart.II.C.2; EZRACHI & STUCKE, *supra* note 34, at 230–31. Of course, determining what an algorithm is programmed to do is not always easy. *See* FRANK PASQUALE, THE BLACK BOX SOCIETY: THE SECRET ALGORITHMS THAT CONTROL MONEY AND INFORMATION 8–9 (2015).

224. *See* EZRACHI & STUCKE, *supra* note 34, at 230–31.

225. *See supra* Subpart.IV.A.1; Budish et al., *supra* note 184, at 1548–49.

226. *See supra* Subparts.III.C, IV.B.2; *see, e.g.*, John F. Barry III, *The Economics of Outside Information and Rule 10b-5*, 129 U. PA. L. REV. 1307, 1316–19 (1981). Another defense of intramarket resale might be that

argument that we considered and rejected in Subpart III.A, however.[227] In the context of securities and commodities, the argument is that the man who does nothing more productive than to buy low and sell high, earning a windfall profit that represents a pure redistribution of wealth from buyers to himself, nevertheless does something socially useful by pushing prices up to reflect the maximum value that buyers place on goods. This ensures that sellers know the full value that buyers place on companies and commodities, allowing sellers—at least the original securities issuers and commodities producers—to incur costs in producing them that are consistent with that value.[228] The critique of signaling in Subpart III.A makes clear that this defense of speculation is based on false necessity: Prices do not actually need to approximate maximum willingness to pay in order for issuers or producers to allocate the right amount of resources toward building their firms or producing commodities.[229] When a trader chooses to allow a security or commodity to sell out at the pre-surge price, the trader actually sends an equally useful signal to the market.[230] The trader tells the market approximately what cost of production an issuer or producer must have to compete effectively against other issuers or producers in the market.[231] This cost signal ensures that firms incur costs no higher than necessary to serve the market.[232]

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it shifts risk from producers who are less able to bear it to resellers who may be better able to bear it. A producer might, for example, face the risk that demand might decline unexpectedly, resulting in a loss of $10 million, or that demand might increase unexpectedly, resulting in a gain, thanks to surge pricing, of $10 million. But a reseller that acquires the producer's inventory and hence its risks of gain and loss might face, overall, no risk after the acquisition because the reseller might also own assets that would *appreciate* in value by $10 million in the event of an unexpected shortfall in demand and *depreciate* in value by $10 million in the event of an unexpected surge in demand, effectively causing the reseller to break even in both eventualities. This certainly is a socially useful role for a reseller to play, and resellers can play it even under a surge pricing ban. Under a ban, resellers remain free to engage in resale so long as they do not engage in surge pricing with respect to the goods that they resell. A producer would still be perfectly free to transfer an inventory that might command a profit of $10 million or make a loss of $10 million, and resellers would still be perfectly free to acquire that inventory and resell it. But the source of the possible $10 million gain could not be surge pricing, at least not algorithmic surge pricing. The prospect of profit might be due instead to the scarcity of the product, which would enable the inventory to generate profits even at competitive, pre-surge prices. *See* RAMSI A. WOODCOCK, *The Progressive Case Against Progressive Antimonopolism*, *in* TOWARD AN INFRAMARGINAL REVOLUTION: REDISTRIBUTING THE GAINS FROM TRADE (Ramsi A. Woodcock ed., 2025) (manuscript at 3) (forthcoming July 2025) (on file at SSRN). The fact that under a surge pricing ban no reseller would be able to make a profit from surge pricing would not keep resellers from entering the market to perform the risk shifting function, because that function benefits resellers, since inventory flows from firms that are less able to bear risk to those that are better able to do it. In the example, the reseller is able to use the inventory to hedge its risk from other assets; thus, the reseller gains and should be willing to engage in resale even absent the opportunity to profit on the resale using surge pricing.

227. *See* Subpart.III.A.

228. *See* Barry, *supra* note 226 ("Under these conditions, securities prices should continuously reflect all available information, leading to greater accuracy in the pricing of individual securities and to a more efficient allocation of resources. When stocks and their prospects for success or failure are evaluated by a process that reflects all available information, investors can more rationally compare competing companies.").

229. *See supra* Subpart.III.A; Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52.

230. *See* Woodcock, *The Hidden Shortages of the Market Economy*, *supra* note 52.

231. *See id.*

232. *See id.*

It should be no surprise that there is more than one kind of valuable information to be signaled to the market, because markets contain two different kinds of information: information about demand, represented by the demand curve, and information about supply, represented by the supply curve.[233] Rationing with price conveys information about demand.[234] But selling out contains information about supply.[235] Both kinds of information inform the market's allocative decisions, and so both help markets to allocate efficiently.[236] The only really important difference between the two is that the price signal enriches sellers at the expense of buyers because it gives sellers information about the maximum that buyers are willing to pay, whereas the sold-out signal enriches buyers at the expense of sellers because it limits sellers to information on the level of costs required to compete successfully in the market.[237] Human intuition was right all along to revile the speculator as engaged in an essentially redistributive project in favor of himself.[238]

3. Accounting for Risk

One loose end in the argument for a blanket ban on all price gouging, both algorithmic and non-algorithmic, is the possibility that firms will make investment decisions based on the probability of generating profits from surge pricing.[239] The profits generated by surge pricing are probabilistic in the sense that they arise from unexpected surges in demand. In the first instance, this prevents firms from increasing costs in anticipation of generating surge pricing profits. But if firms can determine the probability of generating surge pricing profits, they can achieve enough certainty regarding future profits to increase their investments in expectation of being able to pay for them out of those profits. If they do, then a ban on surge pricing could prevent firms from covering their costs and therefore be inefficient. In the argument for an antitrust rule against surge pricing in Subpart II.C.2, this problem was resolved by observing that investment and economic growth were healthy in the decades immediately before the advent of surge pricing.[240] It followed that banning surge pricing, which provides profits *additional* to what was on offer before surge pricing became possible, is unlikely to prevent firms from achieving optimal levels of investment. This argument cannot, however, be used to support a ban that would include non-algorithmic price gouging, because non-algorithmic price gouging existed before the information age. Firms have non-algorithmically exploited the

233. *See id.*
234. *See id.*
235. *See id.*
236. *See id.*
237. *See supra* Subpart.IV.B.2.
238. *See* Sebastian Lotz & Andrea R. Fix, *Not All Financial Speculation Is Treated Equally: Laypeople's Moral Judgments about Speculative Short Selling*, 37 J. ECON. PSYCH. 34, 35 (2013).
239. *See supra* Subpart.IV.B.2.
240. *See* Subpart.II.C.2.

shortages created by unexpected surges in demand since time immemorial.[241] Non-algorithmic price gouging was in use during the period of healthy economic growth and investment that preceded the advent of surge pricing.[242] It may well have contributed to the economic growth and investment that flourished during that period. Eliminating it might conceivably prevent firms from achieving optimal level of investment and reduce growth today.[243]

To address this problem, a blanket rule against price gouging, both algorithmic and non-algorithmic, would really need to be two rules. One would be the blanket ban on surge pricing (i.e., algorithmic price gouging) that is the main proposal of this Article. The other would be a rule against non-algorithmic price gouging that would apply only where the surge in demand was not only unexpected but *unforeseen*. The distinction between unexpected and unforeseen demand surges is technical but important. A surge in demand that a firm thought was possible, but not likely to happen, is an unexpected surge in demand.[244] A surge in demand that the firm thought was impossible, but which happened anyway, is an unforeseen surge in demand.[245] This distinction is important because a firm that thinks a surge in demand is impossible will not factor the possibility of earning profits from raising prices during a surge into account in deciding whether to make investments. So it is possible to ban price gouging in the case of unforeseen surges in demand without altering the investment behavior of firms.

In economic parlance, the distinction between unexpected and unforeseen surges is a distinction between risk and uncertainty.[246] Firms can make investment decisions on the assumption that surge pricing profits will eventually pay for them when those profits involve known unknowns—possibilities to which a firm can assign probabilities based on past experience.[247] The firm can then use those probabilities to estimate how much profit it will generate from surge pricing and can use to pay for investments. For example, a firm that believes that there is a 5 percent chance that demand will surge, allowing the firm to generate two hundred dollars in surge pricing profits, might estimate the probability-adjusted gains from price gouging to be 5 percent of two hundred dollars. If firms are risk neutral and the market is competitive, the firm will incur additional investment costs equal to ten dollars (5% of $200) in reliance on the availability of these surge pricing profits. Indeed, as already noted in Subpart

241. *See, e.g.*, ARISTOTLE, THE POLITICS 90–91 (Trevor J. Saunders ed., T.A. Sinclair trans., 1981) (recounting that ancient Greek philosopher Thales took advantage of an unexpected surge in demand for olive presses to let them out at any rate which he pleased, and made a quantity of money).

242. For example, every time a scalper stood in front of a baseball stadium in the early 2000s and tried to charge a price for a ticket that was above face value, non-algorithmic surge pricing took place.

243. *See* FRIED, *supra* note 210, at 202.

244. *See* Stephen F. LeRoy & Larry D. Singell, Jr., *Knight on Risk and Uncertainty*, 95 J. POL. ECON. 394, 394–95 (1987).

245. *Id.*

246. *Id.*

247. *See id.*

II.F, these profits will no longer count as profits in the economic sense but rather as quasi-profits because they can now be spent to cover costs (e.g., to pay for investment in research and development).

By contrast, firms will never plan on spending surge pricing profits that are uncertain in the economic sense because uncertainty involves unknown unknowns—states of the world that cannot be assigned a numeric probability or possibly even imagined.[248] Lacking the ability to assign numeric probabilities to those states of the world, firms cannot estimate the profits that they might generate from them. If a firm does not know that there is a 5 percent chance of a surge in demand that will yield two hundred dollars in profits through surge pricing, the firm will not plan on investing those two hundred dollars or any fraction thereof. It follows that a ban on non-algorithmic price gouging in relation to unforeseen (i.e., uncertain) surges in demand will not prevent firms from covering their costs. Firms will not make any investments in reliance on generating unforeseeable price gouging profits.

The distinction between unexpected and unforeseen surges has the same analytic significance as the distinction between unexpected and expected surges. In this Article, we first argued that firms do not use profits generated from price gouging to cover costs because the surges in demand that enable price gouging are unexpected. If firms did not expect demand surges, then firms cannot plan on exploiting them to cover costs. But the ability of firms to assign probabilities to demand surges and estimate the amount of money they will generate from them complicated this argument. It suggested that firms might be able to plan on using profits from demand surges to cover costs after all. The concept of the unforeseen surge in demand provides a rejoinder. Firms may be able to use probabilities to plan on exploiting demand surges to cover costs, but some surges in demand will not only be unexpected but also unforeseeable, and firms will never be able to rely on unforeseeable surges to cover costs. Firms lack the data to assign them probabilities and so cannot predict them.

Limiting a ban on non-algorithmic price gouging to unforeseen surges in demand avoids the problem that firms may use probabilities to estimate profits from price gouging. But implementing a ban on non-algorithmic price gouging when the surge is unforeseen would be harder than implementing a blanket ban on surge pricing. That is because proving that demand reached *unexpected* levels, as required to implement a ban on surge pricing, only requires information regarding the demand level expected by the firm's pricing algorithm. By contrast, proving that demand reached *unforeseen* levels, as required to ban non-algorithmic price gouging when the surge is unforeseen, requires information regarding which levels of demand the firm thought were impossible or to which the firm otherwise lacked the ability to assign probabilities. Only practitioners of non-algorithmic price gouging that engage in

248. *See id.*

a systematic consideration of possible states of the world are likely to leave a paper trail regarding states of the world that they believe to be impossible. Moreover, because non-algorithmic price gouging does not, of course, use algorithms, finding that paper trial would in fact involve rummaging through paper, or at least consulting electronic information that is not directly integrated into the firm's pricing processes and so may be easier for firms to hide. Difficulty of enforcement is not, however, an argument against banning non-algorithmic price gouging when the surge is unforeseen. Liberal construal of a ban, such as by treating proof that a firm never considered the possibility that demand might reach a certain level as equivalent to proof that the firm thought that level of demand to be impossible, could help give it more bite.

CONCLUSION

Surge pricing is the exploitation of lapses in the beats of industrial hearts that are too well loved by consumers. Not just love is required, but the *coup de foudre*. Then firms find themselves facing a demand for which neither the firms nor anyone else has prepared, and, in consequence, there is scarcity—that root of all power, economic and otherwise. Firms that *create* scarcity can violate the antitrust laws. But scarcity born of sudden ardor does not violate them, for who can create a clap of lightning? Power acquired by chance may legally be exploited; the firm can raise price during that lapse in the beat of the industrial heart while the defibrillator of production remains suspended above, poised but as yet unable to get it pumping again. During this pause, the firm can ration access to its good by raising price. That is, the firm can increase price until the good is no longer in danger of selling out, despite the surge in demand, because some of those who would have been willing to buy at the pre-surge price are driven from the market by the high price. In raising price, the firm raises its revenues above its costs, for inventories have not had time to expand, and the pre-surge price would have been chosen to cover the cost of existing inventories.

But the firm's entitlement to exploit its admirers should be limited. The firm should not be permitted to heighten its powers of exploitation by adopting technologies that increase the speed with which the firm can raise price. To do that is anticompetitive in the sense that it hastens the dissipation of the effects of any competition that predated the surge in demand, which effects would otherwise be felt in the form of the persistence of the firm's charging of the presumptively competitive pre-surge price over the course of the surge. By the same token, antitrust does not prohibit tacit collusion, which can give a group of firms power over price but little ability actually to target a particular higher price. But antitrust does prohibit price fixing, which dissipates the effects of any competition that existed before the collusion commenced by allowing the colluders actually to agree upon and impose a particular higher price. Thus the antitrust limit to price gouging must be algorithms. It must be that while firms can ration the lapses of production with price all they want, they cannot use

algorithms to do it faster. They can engage in price gouging but not surge pricing.

Perhaps because surge pricing is ultimately exploitation—it is the charging of prices that are above costs and so not necessary to induce production—all of surge pricing's defenses are defenses of exploitation writ large. One such defense is that high prices charged during a shortage signal to competitors that there are profits to be made by entering the market to end the shortage. This argument can be deployed in defense of all attempts to use price to ration access to a good in short supply, not just the particular form that is surge pricing. The fault in this defense is that the alternative to rationing with price, which is to let the good sell out at a price that just covers costs (the pre-surge price in the surge pricing context), is just as good at signaling. The sold-out signal tells competitors that there are profits to be made by entering the market to sell at a price that is slightly higher than the low price that covers costs (i.e., the pre-surge price in the surge pricing context), just as rationing with price tells competitors that there are profits to be made by entering the market to sell at a price that is slightly lower than the high ration price (i.e., lower than the surge price in the surge pricing context). The sold-out signal has the advantage of bringing the lowest cost production into the market first. The signal sent by rationing with price has the advantage of potentially appealing to more competitors with a wider variety of cost profiles. It is unclear which of the two is better for consumers, and so signaling provides no basis for preferring rationing with price—or, indeed, surge pricing—to selling out.

The other major defense of surge pricing is that high, surge prices allocate scarce goods to those who value them the most. This argument, too, can be deployed in defense of all attempts to use price to ration access to goods in short supply, not just the particular form that is surge pricing. And the trouble with the argument, here again, is that the alternative of selling out does the same. Rationing with price allocates based on willingness to pay, which is an imperfect proxy for value because the rich are willing to pay more for things like food that they value no more than the rest of us. Selling out allocates based on the principle of antecedence, which is also an imperfect proxy for value because those who place the highest value on a good are not always able to claim it first. The important thing is that it is not clear which proxy is worse, with the result that the need to allocate goods to those who value them the most provides no basis for preferring rationing with price—or, indeed, surge pricing—to selling out.

Signaling and allocative efficiency are both used to justify an astonishing range of economic activity, from stock market speculation to the enclosure and sale of virgin land. The generality of these two defenses of surge pricing tells us something about the generality of the critique of surge pricing. At its heart, surge pricing is the exploitation of scarcity. The critique of surge pricing is therefore really a critique of all exploitation of scarcity. Why, then, focus specifically on surge pricing? The reason is that surge pricing is comparatively easy to ban. In most cases of price increases that exploit scarcity, it is unclear what part of the

price increase is due to scarcity and what part is required to cover costs. That prevents imposition of a general ban. In such cases, rate regulation or taxation are needed to protect consumers. Those regimes attempt to determine costs and to eliminate only revenues in excess thereof. Surge pricing can more easily be banned because the unexpectedness of the surge catches firms off guard. They have already set their prices to cover the costs of their existing inventory and have no plan to produce more in the short run. When firms raise prices during the surge—before they have time to incur additional costs by increasing output—they therefore necessarily raise their prices above their costs, and so the law can be confident that productive economic behavior will not be affected by a ban on surge pricing.

But the distribution of wealth will change.

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