DISRUPTIVE INCUMBENTS: PLATFORM COMPETITION IN AN AGE OF MACHINE LEARNING

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Recent advances in machine learning have reinforced the competitive position of leading online platforms. This Essay identifies two important sources of platform rivalry and proposes ways to maximize their competitive potential under existing antitrust law. A nascent competitor is a threatening new entrant that, in time, might become a full-fledged platform rival. A platform's acquisition of a nascent competitor should be prohibited as an unlawful acquisition or maintenance of monopoly. A disruptive incumbent is an established firm—often another platform—that introduces fresh competition in an adjacent market. Antitrust enforcers should take a more cautious approach, on the margin, when evaluating actions taken by a disruptive incumbent to compete with an entrenched platform.

INTRODUCTION

The leading online platforms—Google in search, Facebook in social network services, and Amazon in e-commerce—benefit from economies of scale and access to user data that are difficult for rivals to replicate. These barriers are reinforced by advances in machine learning, a set of artificial intelligence (AI) techniques[1] that use models to "learn" desired behavior from "examples rather than instructions."[2] This Essay considers how competition might be enhanced, notwithstanding these advantages, under existing antitrust law.[3]

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1. As used here, artificial intelligence refers to technologies that mimic or resemble some aspect of human intelligence. In some contexts, the AI label can be misleading, given that the task at issue—for example, online search—was automated to begin with, and the deployment of improved software does not entail any direct replacement of labor. See Timothy Bresnahan, Artificial Intelligence Technologies and Aggregate Growth Prospects 2 (May 2019) (unpublished manuscript) (on file with the *Columbia Law Review*) (discussing this issue).

2. Machine Learning, IBM Design for AI, https://ai-design.eu-de.mybluemix.net/design/ai/basics/ml [https://perma.cc/T5NK-TCU7] (last visited Sept. 30, 2019). See generally A.L. Samuel, Some Studies in Machine Learning Using the Game of Checkers, 3 IBM J. Res. & Dev. 211 (1959) (coining the term "machine learning"). For further discussion, see infra section I.A.

3. Machine learning also challenges antitrust policy by facilitating collusion and price discrimination. For a discussion, see generally Ariel Ezrachi & Maurice Stucke,

Two sources of platform competition are particularly important. A *nascent competitor* is a threatening new entrant that, in time, might become a full-fledged platform rival. For example, Instagram posed an important threat to Facebook shortly after Instagram's launch in 2010. A *disruptive incumbent* is an established firm, often another platform, that introduces fresh competition in an adjacent platform market. For example, Microsoft's Bing search platform competes with Google's. In turn, Google vies with Amazon for so-called shopping starts—that is, to be the starting place for online shoppers.

Antitrust law protects nascent competitors as a source of platform entry.[4] This Essay argues that the Sherman Act prohibits the acquisition of a nascent competitor as a form of unlawful monopolization.[5] Monopolization, a branch of antitrust law typically concerned with exclusionary conduct, also reaches acquisitions and other cooperative behavior. The law extends to both newly announced mergers and other transactions, such as Facebook's acquisition of Instagram in 2012, that have been consummated. Some transactions also violate Section 7 of the Clayton Act, the statute ordinarily relied upon to prohibit unlawful mergers.[6] The Sherman Act approach, however, is a better fit for the evaluation of some acquisitions, due in part to judicial recognition that the target need not operate in the same antitrust market as the acquirer.[7]

Disruptive incumbents are a second, and underappreciated, source of platform competition.[8] A disruptive incumbent is well positioned to compete with a dominant platform in an adjacent market. Such firms can deploy a variety of large-firm advantages without fear of cannibalizing their home market. Thus, disruptive incumbents sidestep a longstanding debate, associated with economists Joseph Schumpeter and Kenneth Arrow, about whether monopoly or competition best promotes innovation.[9] This Essay suggests that antitrust enforcers should consider a lighter touch toward enforcement, on the margin, if such a firm is "punching up" to compete with a platform—think of Google presenting shopping search results in a particular (by assumption, legally contestable) manner to better compete with Amazon.

As challengers, neither nascent competitors nor disruptive incumbents are sure things. Instagram, absent the acquisition, might have failed to compete with Facebook. Google might ultimately lose its battle with Amazon for shopping starts, even if antitrust enforcers leave this aspect of its conduct alone. Given the potentially large benefits of

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Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy (2016). These developments are beyond the scope of this Essay.

4. See infra Part II.
5. See 15 U.S.C. § 2 (2012).
6. See id. § 18.
7. See infra section II.B.
8. See infra Part III.
9. See infra section III.A.

successful competition from a disruptive incumbent, a modest probability of success may sometimes justify a lighter touch, provided that the negative collateral consequences—and, to be clear, there may be some—are not too large.

This Essay proceeds in three parts. Part I spells out several barriers to platform entry, emphasizing the role of machine learning, and the benefits of increased competition. Part II makes the case that a platform's acquisition of a nascent competitor may constitute unlawful monopolization. Part III explains the role of disruptive incumbents and their relevance to the Arrow–Schumpeter debate, suggesting conditions under which their conduct might merit a lighter touch from antitrust enforcers.

I. PROMOTING PLATFORM ENTRY

A. *Machine Learning as a Barrier to Entry*

Leading platforms make money by matching users with advertisers and products.[10] Google and Facebook display ads alongside other content, such as Google's unpaid "organic" search results and Facebook's news feed.[11] The platform is typically paid when a user clicks on the ad.[12] Amazon matches users with recommendations about products available for purchase and makes money from successfully completed purchases.[13]

The matching process is driven in part by algorithms that predict the likelihood that a user will click on an ad or buy a product. Google runs a complex auction among advertisers that vie for placement on the search engine results page in response to a user search.[14] For each proposed ad, Google calculates an "Ad Rank," which incorporates a prediction about

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10. Ajay Agrawal, Joshua Gans & Avi Goldfarb, Prediction Machines: The Simple Economics of Artificial Intelligence 83 (2018); Bresnahan, supra note 1, at 6.

11. Google and (to a lesser degree) Facebook also place ads on independent websites and mobile apps. See Display Campaigns, Google Ads, https://ads.google.com/home/campaigns/display-ads [https://perma.cc/92EQ-BV5S] (last visited Sept. 30, 2019) (describing display ads placed by Google on third-party websites); Google, How AdSense Works, AdSense Help, https://support.google.com/adsense/answer/6242051 [https://perma.cc/W2AB-LYQW] (last visited Sept. 30, 2019) (describing search ads placed by Google on third-party websites); see also Audience Network by Facebook, Facebook, https://www.facebook.com/audiencenetwork/products [https://perma.cc/F8M7-TK3X] (last visited Sept. 30, 2019) (describing a Facebook ad product delivered to mobile apps and mobile websites).

12. Other payment models similarly rely upon a measurable user action, such as making a purchase. See Magdalena Rzemieniak, Measuring the Effectiveness of Online Advertising Campaigns in the Aspect of E-Entrepreneurship, 65 Procedia Computer Sci. 980, 981–83 (2015) (reviewing various payment models).

13. Amazon also makes money from ads and from marketing expenditures by sellers. Amazon.com, Inc., Annual Report (Form 10-K) 42 (Jan. 31, 2019) [hereinafter Amazon 2018 Annual Report] (describing revenue from pay-per-click and pay-per-impression ads).

14. About Ad Position and Ad Rank, Google Ads Help, https://support.google.com/google-ads/answer/1722122 [https://perma.cc/J5QK-YTCJ] (last visited Sept. 30, 2019).

the probability that a user will click on the ad.[15] Facebook's ad system similarly relies on a prediction of the clickthrough rate.[16] Amazon's system relies upon an analogous prediction about which products are most likely to interest a user.[17]

Machine learning improves the predictions of the matching algorithms. The learning occurs inductively—that is, bottom up—via automated evaluation of the examples.[18] For example, Google uses machine learning—incorporating what Google knows about the user, the search term, and the ad—to help predict the clickthrough rate for a specific user as to a specific ad.[19] Amazon likewise uses machine learning to improve its product recommendations.[20] The leading platforms have been relying on machine learning to improve their predictions for some years, which is hardly surprising, given that this tool is well suited to concrete metrics such as the clickthrough rate or purchase rate. Moreover, erroneous predictions are not very costly. If the suggestion is inapt, that simply means that a user does not click or buy.[21]

The leading platforms have avidly pursued investments in machine learning. Alphabet (Google's parent company) places machine learning front and center in its 2018 annual report,[22] and the head of AI reports directly to Google's CEO.[23] According to its CEO, Google is "applying

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15. All else equal, a more frequently clicked ad is more valuable to Google. Id. The organic results are generated by other complex algorithms, which were originally based on PageRank but now factor in hundreds of other signals. How Search Algorithms Work, Google Search, https://www.google.com/search/howsearchworks/algorithms [https://perma.cc/R54W-CFAR] (last visited Sept. 30, 2019).

16. Xinran He, Junfeng Pan, Ou Jin, Tianbing Xu, Bo Liu, Tao Xu, Yanxin Shi, Antoine Atallah, Ralf Herbrich, Stuart Bowers & Joaquin Quiñonero Candela, Practical Lessons from Predicting Clicks on Ads at Facebook, Facebook Research (Aug. 24, 2014), https://research.fb.com/wp-content/uploads/2016/11/practical-lessons-from-predicting-clicks-on-ads-at-facebook.pdf [https://perma.cc/6R9W-GCC7].

17. Brent Smith & Greg Linden, Two Decades of Recommender Systems at Amazon.com, IEEE Internet Computing, May–June 2017, at 12, 12.

18. See Samuel, supra note 2, at 211 (defining "machine learning" by reference to "[p]rogramming computers to learn from experience" rather than specifying a "solution in minute and exact detail").

19. Matt Lawson, Grow Your Business Faster with Machine Learning: Part I, Google Ads Blog (Jan. 8, 2018), https://www.blog.google/products/ads/adwords-machine-learning-part-1 [https://perma.cc/79ZF-MAG2].

20. Jeffrey P. Bezos, 2016 Letter to Shareholders, Amazon Blog: Day One (Apr. 17, 2017), https://blog.aboutamazon.com/company-news/2016-letter-to-shareholders [https://perma.cc/C6GG-G9RX] (explaining that machine learning "drives" product recommendation algorithms, among others).

21. Bresnahan, supra note 1, at 11. Contrast this with the high cost of a failure to automatically filter inappropriate content out of a Facebook news feed. Id. at 17–18.

22. Alphabet Inc., Annual Report (Form 10-K) 3 (Feb. 4, 2019) ("Across the company, machine learning and [AI] are increasingly driving many of our latest innovations.").

23. See Google: Org Chart, The Org, https://theorg.com/org/google [https://perma.cc/Z6JU-HAZN] (last visited Sept. 30, 2019) (showing Google's AI Lead among the CEO's direct reports).

machine learning and AI . . . across every one of [its] products" as part of an "AI-first approach."[24] Amazon uses machine learning to forecast demand and place fulfilment centers, among other tasks.[25] Salaries for scarce technical talent have skyrocketed.[26] Some of these investments and advances pertain to so-called "deep learning," a set of machine learning techniques that make domain expertise less important.[27] Facebook's technical infrastructure is reportedly "entirely built around" deep learning.[28] At Google, the introduction of deep learning rapidly doubled its computational load.[29]

Advances in machine learning reinforce the strong position already enjoyed by the leading platforms. Making an improvement by this method has a high fixed cost and low marginal cost, a combination that tends to favor large firms that can spread the fixed cost over a large number of units. A firm with a large existing base of users is particularly well

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24. Google Developers, Google I/O Keynote (Google I/O '17), YouTube (May 17, 2017), https://www.youtube.com/watch?v=Y2VF8tmLFHw (on file with the *Columbia Law Review*) ("[I]n an AI-first world, we are rethinking all our products and applying machine learning and AI to solve user problems. And we are doing this across every one of our products."); see also Ross Kelly, Forget Putting Mobile First, It's All About AI These Days: Google CEO, Chief Executive (May 18, 2017), https://chiefexecutive.net/forget-putting-mobile-first-ai-days-google-ceo [https://perma.cc/7MXF-6LLD] (reporting Google CEO's remarks).

25. See Machine Learning Center of Excellence, Amazon Jobs, https://www.amazon.jobs/en/teams/machine-learning [https://perma.cc/AH5X-36XJ] (last visited Sept. 30, 2019).

26. Cade Metz, Tech Giants Are Paying Huge Salaries for Scarce A.I. Talent, N.Y. Times (Oct. 22, 2017), https://www.nytimes.com/2017/10/22/technology/artificial-intelligence-experts-salaries.html [https://perma.cc/J8LG-8VMF] ("Salaries are spiraling so fast that some joke the tech industry needs a National Football League-style salary cap on A.I. specialists.").

27. Deep learning is a class of machine learning techniques that process examples with relatively little domain-specific instruction from the implementer. For example, perspective presents a serious difficulty in image-labeling tasks. A traditional machine learning approach to image labeling might include a detailed model of perspective. By contrast, a deep learning approach would dispense with the need for such a model in its initial configuration. Instead, the software arrives at its own method for overcoming the difficulties. For a seminal paper illustrating this approach, see Alex Krizhevsky, Ilya Sutskever & Geoffrey Hinton, ImageNet Classification with Deep Convolutional Neural Networks, Comm. ACM, June 2017, at 84, 84–85 (describing an image recognition system without reliance upon image-processing-specific logic); see also Hal Varian, Artificial Intelligence, and Industrial Organization, *in* The Economics of Artificial Intelligence: An Agenda 399, 399–400 (Ajay Agrawal, Joshua Gans & Avi Goldfarb eds., 2019) (providing a brief explanation of the deep learning approach).

28. Rachel Metz, Facebook's Top AI Scientist Says It's "Dust" Without Artificial Intelligence, CNN Bus., https://www.cnn.com/2018/12/05/tech/ai-facebook-lecun/index.html [https://perma.cc/FG78-HMU8] (last updated Dec. 5, 2018) ("The technology is included in everything from the posts and translations you see in your news feed to advertisements.").

29. Jeff Dean, David Patterson & Cliff Young, A New Golden Age in Computer Architecture: Empowering the Machine-Learning Revolution, IEEE Micro, Mar./Apr. 2018, at 21, 22 (describing a doubling in "computation demands" due to increased use of "deep neural networks," and the development of custom hardware to handle these demands).

positioned to profit from—and hence, incentivized to pursue—any incremental benefit. Even a small improvement can make a big difference to the bottom line. The same argument applies to custom hardware to support machine learning, which Google and others have invested in to provide greater processing power at a given cost.[30]

Machine learning advances also reinforce the importance of access to data.[31] A larger stock of searches and observed outcomes—for example, whether the user clicked—generates data needed to train and improve the prediction of the algorithm.[32] The importance of scale is heightened by the high variability of user data.[33] With too few queries, it is difficult to train the algorithm to match queries effectively.[34] This advantage is subject to the limiting principle that eventually there are decreasing returns to scale.[35]

A particular type of data, user history, is important in some applications. Recommendations and ads reflect inferences based on a user's previous purchases and searches.[36] Moreover, the past behavior of a large set of users provides a helpful starting point for predicting the behavior of an individual user. For example, Amazon suggests that a purchaser of

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30. See Norman P. Jouppi, Cliff Young, Mishant Patil & David Patterson, Motivation for and Evaluation of the First Tensor Processing Unit, IEEE Micro, May/June 2018, at 10, 14 tbl.2, 16 tbl.4 (reporting much higher performance and lower power usage for custom hardware, compared to traditional hardware); see also Kalin Ovtcharov, Olatunji Ruwase, Joo-Young Kim, Jeremy Flowers, Karin Strauss & Eric S. Chung, Microsoft, Toward Accelerating Deep Learning at Scale Using Specialized Hardware in the Datacenter 7 (2015) (on file with the *Columbia Law Review*) (noting that servers with chips that support the use of machine learning result in "low overhead in power and cost per server").

31. Judith Chevalier, Comment on "Artificial Intelligence, Economics, and Industrial Organization," *in* The Economics of Artificial Intelligence, supra note 27, at 419, 419 (emphasizing lack of data access as a barrier to entry).

32. He et al., supra note 16, fig.10 (showing lower quality of prediction when using only one percent of Facebook training data).

33. Google collects a set of data points, or "features" of a user, to help predict the clickthrough rate. H. Brendan McMahan, Gary Holt, D. Sculley, Michael Young, Dietmar Ebner, Julian Grady, Lan Nie, Todd Phillips, Eugene Davydov, Daniel Golovin, Sharat Chikkerur, Dan Liu, Martin Wattenberg, Arnar Mar Hrafnkelsson, Tom Boulos & Jeremy Kubica, Ad Click Prediction: A View from the Trenches, Google Research § 4 (2013), https://static.googleusercontent.com/media/research.google.com/en//pubs/archive/41159.pdf [https://perma.cc/L5US-826P]. Even at Google's massive scale, about half of the features collected are completely unique and therefore lack predictive power. Id.

34. See He et al., supra note 16, fig.10 (describing increased accuracy accomplished with a larger dataset).

35. See Varian, supra note 27, at 406 (applying to machine learning the "general principle" that "data typically exhibits decreasing returns to scale like any other factor of production").

36. See, e.g., Greg Linden, Brent Smith & Jeremy York, Amazon.com Recommendations: Item-to-Item Collaborative Filtering, IEEE Internet Computing, Jan.–Feb. 2003, at 76, 78 ("Given the user's purchased and rated items, the algorithm constructs a search query to find other popular items by the same author, artist, or director, or with similar keywords or subjects.").

Prediction Machines: The Simple Economics of Artificial Intelligence [37] might also want to buy *Applied Artificial Intelligence* [38] because past customers have done so.[39] The importance of user history varies by application, and more recent user data often have an outsized importance.[40] Still, user history is a resource that an entrant cannot easily replicate. Absent data portability, this information is difficult to acquire even at a high price.[41]

Machine learning may reduce the need to retain historical data, or so much of it. For certain models, once past results are incorporated into the model, no further use of the historical data is made when making further predictions.[42] As a fanciful example, if a user buys only books about artificial intelligence, making use of that insight for prediction does not require referring back to the full list of past purchases. Historical data are still useful to train a new model, posing a downside to simply discarding the data.

Reduced reliance on historical data, including personally identifiable information, would ease privacy concerns stemming from the retention of such information.[43] This technical possibility, however, does not lower the barrier to entry for other firms, which still lack access to the historical data now incorporated into the incumbent's algorithm. By undermining the effectiveness of access and portability proposals, which rely on the transfer of user data as a way to jumpstart competition, certain barriers to entry may actually increase.[44]

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37. Agrawal et al., supra note 10.

38. Mariya Yao, Marlene Jia & Adelyn Zhou, Applied Artificial Intelligence: A Handbook for Business Leaders (2018).

39. Prediction Machines: The Simple Economics of Artificial Intelligence, Amazon, https://www.amazon.com/Prediction-Machines-Economics-Artificial-Intelligence/dp/1633695670 [https://perma.cc/FFT5-EVTW] (last visited Sept. 30, 2019) (showing, on the product page, that customers often buy *Applied Artificial Intelligence* after viewing *Prediction Machines*).

40. See Kim Hazelwood, Sarah Bird, David Brooks, Soumith Chintala, Utku Diril, Dmytro Dzhulgakov, Mohamed Fawzy, Bill Jia, Yangqing Jia, Aditya Kalro, James Law, Kevin Lee, Jason Lu, Pieter Noordhuis, Misha Smelyanskiy, Liang Xiong & Xiaodong Wang, Applied Machine Learning at Facebook: A Datacenter Infrastructure Perspective, Facebook Research § IV.B (2018), https://research.fb.com/wp-content/uploads/2017/12/hpca-2018-facebook.pdf [https://perma.cc/8MQY-LN3K] (describing problems arising from the use of "stale models"); He et al., supra note 16, § 3.2 (reporting that "[p]rediction accuracy clearly degrades" with the use of older training data).

41. See Daniel L. Rubinfeld & Michal S. Gal, Access Barriers to Big Data, 59 Ariz. L. Rev. 339, 351 (2017) ("Another barrier may be temporal, relating to the point in time that the competitor started gathering data. To illustrate, a collection of aerial maps before a natural disaster cannot be replicated once the disaster occurs.").

42. See, e.g., McMahan et al., supra note 33, § 3 (describing a class of models in which "each training example only needs to be considered once").

43. See Nat'l Inst. of Standards & Tech., U.S. Dep't of Commerce, NIST Special Pub. 800-122, Guide to Protecting the Confidentiality of Personally Identifiable Information (PII) 4-3 (2010) (outlining the privacy risks of using personally identifiable information).

44. One possible solution is the use of so-called federated learning techniques, in which a user's data are kept locally on the user's machine without the algorithm provider

Improving the matching algorithm is an important application of machine learning, but there are many others. For example, Google relies on machine learning to rank queries in its organic search algorithm,[45] translate webpages,[46] and suggest user responses in email.[47] Deep learning techniques have greatly improved automatic speech recognition,[48] a key input for digital assistants and other voice-based user interfaces.[49] In various ways, these developments, too, may tend to reinforce the position of the leading platforms.

Not all machine learning developments strengthen the barriers to entry. Advances in speech recognition have been achieved using public datasets and do not necessarily require data at a massive scale.[50] Proprietary datasets are sometimes released to the public, thereby enabling innovation on a decentralized basis.[51] Some striking developments have been made using small teams. For example, in 2012, a group at the University of Toronto achieved a major breakthrough in image labeling, using deep learning techniques that are now at the core of the machine

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having direct access to the data. See Brendan McMahan & Daniel Ramage, Federated Learning: Collaborative Machine Learning Without Centralized Training Data, Google AI Blog (Apr. 6, 2017), https://ai.googleblog.com/2017/04/federated-learning-collaborative.html [https://perma.cc/GU2Z-QZJH]. Aside from protecting privacy, federated learning might have the further benefit of increasing the effectiveness of data portability.

45. See Jack Clark, Google Turning Its Lucrative Web Search Over to AI Machines, Bloomberg (Oct. 26, 2015), https://www.bloomberg.com/news/articles/2015-10-26/google-turning-its-lucrative-web-search-over-to-ai-machines [https://perma.cc/9362-SKTY].

46. See Mike Schuster, Melvin Johnson & Nikhil Thorat, Zero-Shot Translation with Google's Multilingual Neural Machine Translation System, Google AI Blog (Nov. 22, 2016), https://ai.googleblog.com/2016/11/zero-shot-translation-with-googles.html [https://perma.cc/6EDU-A9SS].

47. See Anjuli Kannan, Karol Kurach, Sujith Ravi, Tobias Kaufmann, Andrew Tomkins, Balint Miklos, Greg Corrado, László Lukács, Marina Ganea, Peter Young & Vivek Ramavajjala, Google Inc., Smart Reply: Automated Response Suggestion for Email, SIGKDD § 1 (2016), https://www.kdd.org/kdd2016/papers/files/Paper_1069.pdf [https://perma.cc/B2NP-339K] (describing the architecture of Gmail's Smart Reply system).

48. See, e.g., W. Xiong, J. Droppo, X. Huang, F. Seide, M. Seltzer, A. Stolcke, D. Yu & G. Zweig, Microsoft Research, Achieving Human Parity in Conversational Speech Recognition, arXiv § 9 (2017), https://arxiv.org/pdf/1610.05256.pdf [https://perma.cc/WV95-MGM3] ("We find that the machine errors are substantially the same as human ones . . . .").

49. See Bresnahan, supra note 1, at 25–29 (characterizing this development). Digital assistants are offered (as of September 2019) by Alibaba (Genie), Amazon (Alexa), Apple (Siri), Google (Google Assistant), and Microsoft (Cortana).

50. See, e.g., Xiong et al., supra note 48, § 1 (demonstrating machine performance that is on par with human speech recognition performance using a public dataset).

51. See, e.g., Luc Vincent, Unlocking Access to Self-Driving Research: The Lyft Level 5 Dataset and Competition, Medium (July 23, 2019), https://medium.com/lyftlevel5/unlocking-access-to-self-driving-research-the-lyft-level-5-dataset-and-competition-d487c27b1b6c [https://perma.cc/2F64-Z49P] (describing the release of one such dataset in order to facilitate autonomous driving research).

learning efforts of the leading platforms.[52] And although many machine language advances and insights by the incumbents are held as trade secrets, there are important knowledge spillovers that benefit everyone working in these fields.

Moreover, incumbents have placed certain advances in machine learning at the disposal of other firms. For example, a major revenue stream for Amazon is Amazon Web Services (AWS), which sells storage and computing power to other businesses.[53] AWS has enabled a great deal of innovation by other firms. For example, the leading file storage firm Dropbox, for much of its existence, relied on AWS to do the actual file storage.[54] AWS also offers pretrained machine learning models on its platform.[55] Google, meanwhile, sells time on its custom hardware[56] and has released a free suite of tools to facilitate the development of new machine learning systems.[57]

Considered as a whole, advances in machine learning tend to reinforce the market position of the leading platforms. There is reason to agree with the *Economist*'s assessment, emphasizing various advantages of the incumbents: "It seems likely that the incumbent tech groups will capture many of AI's gains, given their wealth of data, computing power, smart algorithms and human talent, not to mention a head start on investing."[58]

B. *Encouraging Entry*

Fostering competition against the leading platforms is socially desirable for several reasons. First, competition encourages lower prices and higher quality on both sides of the platform, including lower prices to advertisers and greater privacy protection for users.

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52. See From Not Working to Neural Networking, Economist (June 23, 2016), https://www.economist.com/special-report/2016/06/23/from-not-working-to-neural-networking [https://perma.cc/V2Tx-MUN3].

53. See infra note 123 and accompanying text.

54. See Akhil Gupta, Scaling to Exabytes and Beyond, Dropbox (Mar. 14, 2016), https://blogs.dropbox.com/tech/2016/03/magic-pocket-infrastructure [https://perma.cc/SYM9-R846].

55. Machine Learning on AWS: Putting Machine Learning in the Hands of Every Developer, Amazon, https://aws.amazon.com/machine-learning [https://perma.cc/363Y-UJGZ] (last visited Sept. 30, 2019).

56. Cloud TPU, Google Cloud, https://cloud.google.com/tpu [https://perma.cc/VX7P-V7PM] (last visited Sept. 30, 2019).

57. See An End-to-End Open Source Machine Learning Platform, TensorFlow, https://www.tensorflow.org [https://perma.cc/8378-3ZXT] (last visited Sept. 30, 2019) (describing TensorFlow, an "end-to-end open source machine learning platform").

58. Google Leads in the Race to Dominate Artificial Intelligence, Economist (Dec. 7, 2017), https://www.economist.com/business/2017/12/07/google-leads-in-the-race-to-dominate-artificial-intelligence [https://perma.cc/AAB5-GYFC].

Second, competition spurs innovation.[59] Incumbents are reluctant to cannibalize their existing business. Just think of a mobile telephone service provider considering whether to offer a communications application that it is unable to monetize or control, or a book publisher considering whether to disintermediate itself through self-publishing. As Arrow showed, an incumbent's incentive to innovate is lessened by a "replacement effect," so named because the resulting innovation replaces existing profitable sales.[60] The replacement effect suggests that innovations are more likely to come from an outsider with no existing sales to replace. An incumbent also may be hamstrung by its own earlier success.[61]

Third, competition curbs an incumbent's ability to engage in anticompetitive, self-entrenching conduct. A powerful incumbent may possess the incentive and ability, unless restrained, to starve a rival of access to inputs or customers.[62] This possibility motivates the European Commission's scrutiny of Google and Amazon search results that allegedly favor the platform's own offerings over those of third parties.[63]

These anticipated benefits have prompted commentators to offer a wide range of new policies to increase competition. The proposals range from clear labeling of search results and recommendations, mandated

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59. A counterargument, that incumbency confers a strong incentive and capacity to innovate, is considered infra Part III.

60. See Kenneth Arrow, Economic Welfare and the Allocation of Resources for Invention, *in* The Rate and Direction of Inventive Activity: Economic and Social Factors 609, 619–22 (Richard R. Nelson ed., 1962) ("The preinvention monopoly power acts as a strong disincentive to further innovation."); see also Jean Tirole, The Theory of Industrial Organization 392 (1988) (naming Arrow's argument the "replacement effect"). A similar effect occurs when the switchover to a new product requires a temporary halt to profitable sales. See Thomas J. Holmes, David K. Levine & James A. Schmitz Jr., Monopoly and the Incentive to Innovate When Adoption Involves Switchover Disruptions, Am. Econ. J., Aug. 2012, at 1, 11–12.

61. Clayton M. Christensen, The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail, at xv (1997) (advancing the thesis that a successful firm's focus on its current profitable customers may cause it to neglect other opportunities).

62. See C. Scott Hemphill & Tim Wu, Parallel Exclusion, 122 Yale L.J. 1182, 1200–09 (2013) (discussing mechanisms through which an incumbent may exclude an entrant or rival). Competition does not necessarily curb exclusion, however, if the firms share an interest in exclusion. See id. at 1219–35 (describing firms' incentives and ability to engage in collective exclusion).

63. Commission Decision of June 27, 2017 (Case AT. 39740—Google Search (Shopping)), 2018 O.J. (C 009) ¶¶ 11–14, https://ec.europa.eu/competition/antitrust/cases/dec_docs/39740/39740_14996_3.pdf [https://perma.cc/9LF4-CQ8X] [hereinafter Google Shopping Decision] (finding unlawful Google's promotion of specialized product results over third-party comparison-shopping engines and imposing a €2.4 billion fine); Press Release IP/19/4291, European Comm'n, Antitrust: Commission Opens Investigation into Possible Anti-Competitive Conduct of Amazon (July 17, 2019), https://europa.eu/rapid/press-release_IP-19-4291_en.htm [https://perma.cc/6PAX-QA5F] (raising concerns about Amazon's alleged manipulation of search results to favor its own private label products and retail operation).

data portability, and traditional utility regulation,[64] to new legislation to break up leading platforms.[65] My goal is complementary, albeit more modest—to consider how existing antitrust law can facilitate platform competition. Two sets of competitors present themselves: nascent platform rivals and disruptive incumbents. I consider these in turn.

II. NASCENT COMPETITORS

A. *Facebook's Acquisition of Instagram*

Facebook is the world's dominant social network provider, with more than 2 billion users,[66] a market capitalization in excess of $500 billion,[67] and more than $50 billion in annual revenue.[68] In 2012, Facebook reached a $1 billion deal to acquire Instagram, a photo-sharing app for mobile devices introduced in 2010.[69] The Instagram app made mobile photo sharing easy and fun. Its growth was explosive, rising from 100,000 users in October 2010[70] to 40 million in April 2012.[71]

Success in mobile was hugely important to Facebook's future prospects.[72] Facebook, however, found the move from desktop to mobile to be a difficult challenge and was slow to add a visual element to its offerings.[73] Better photo sharing was a potentially compelling reason for users

64. See Samuel Himel & Robert Seamans, Competition Policy Int'l, Artificial Intelligence, Incentives to Innovate, and Competition Policy 4–10 (2017), https://www.competitionpolicyinternational.com/wp-content/uploads/2017/12/CPI-Himel-Seamans.pdf [https://perma.cc/82G5-L25N] (discussing a range of proposals); see also Marvin Ammori, The FTC Should Take a Broader Look at Transparency, Gigaom (June 23, 2012), https://gigaom.com/2012/06/23/the-ftc-should-take-a-broader-look-at-transparency [https://perma.cc/S7CC-N65U] (calling for more transparency and clear labeling by search engines).

65. Elizabeth Warren, Here's How We Can Break Up Big Tech, Medium (Mar. 8, 2019), https://medium.com/@teamwarren/heres-how-we-can-break-up-big-tech-9ad9e0da324c [https://perma.cc/4MXA-DN4Z].

66. Facebook, Inc., Quarterly Report (Form 10-Q) 25 (July 25, 2019) [hereinafter Facebook Quarterly Report] (reporting 2.4 billion monthly active users as of June 30, 2019).

67. Facebook, Inc., Yahoo Fin., https://finance.yahoo.com/quote/FB [https://perma.cc/2XBT-2BF7] (last visited Oct. 16, 2019) (reporting market capitalization of $538 billion on Oct. 16, 2019).

68. Facebook, Inc., Annual Report (Form 10-K) 33 (Jan. 31, 2019) (reporting $55.8 billion in revenue in 2018).

69. Kara Swisher, The Money Shot, Vanity Fair (May 6, 2013), https://www.vanityfair.com/news/business/2013/06/kara-swisher-instagram [https://perma.cc/2GDV-26UQ].

70. How Many Users Does Instagram Have?, Quora (Oct. 13, 2010), https://www.quora.com/How-many-users-does-Instagram-have [https://perma.cc/V33J-RGKS] (indicating 100,000 active users according to CEO Kevin Systrom).

71. See Matt Burns, Instagram's User Count Now at 40 Million, Saw 10 Million New Users in Last 10 Days, TechCrunch (Apr. 13, 2012), https://techcrunch.com/2012/04/13/instagrams-user-count-now-at-40-million-saw-10-million-new-users-in-last-10-days [https://perma.cc/6UNW-K29K].

72. In the second quarter of 2019, 94% of Facebook advertising revenue was from mobile. Facebook Quarterly Report, supra note 66, at 33.

73. See Swisher, supra note 69.

to prefer Instagram to Facebook. Commentators were quick to recognize this threat. One explained that "Instagram had found and attacked Facebook's [A]chilles heel—mobile photo sharing."[74] Another noted that Instagram's advantages—"hip, elegant, fun, and 'mobile-first'"—posed a "very real threat" to Facebook.[75]

Publicly available information suggests that Facebook recognized the Instagram threat and that its acquisition may have been aimed at its elimination. A top Facebook official reportedly wrote colleagues that the purpose of the transaction was "to eliminate a potential competitor."[76] As a contemporaneous commentator explained, Facebook recognized that "for [the] first time in its life it arguably had a competitor that could not only eat its lunch, but also destroy its future prospects."[77] The FTC and other antitrust enforcers investigated but ultimately declined to challenge the acquisition.[78]

B. *Acquisitions to Acquire or Maintain a Monopoly*

Section 2 of the Sherman Act, which prohibits "monopoliz[ation],"[79] is an appropriate framework for evaluating acquisitions by an incumbent platform. The leading modern Section 2 case is *United States v. Microsoft*.[80] In 1998, the Justice Department and plaintiff states filed suit alleging that Microsoft had identified an emergent threat to its Windows operating system monopoly and had taken improper actions to neutralize it.[81]

The danger posed by the growth of the internet was articulated by CEO Bill Gates in an internal memo to his top lieutenants describing a coming "Internet Tidal Wave."[82] Netscape's browser was the centerpiece of that threat, even though Netscape's offering did not compete with

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74. Om Malik, Here Is Why Facebook Bought Instagram, Gigaom (Apr. 9, 2012), https://gigaom.com/2012/04/09/here-is-why-did-facebook-bought-instagram [https://perma.cc/Z6Z3-AL2S].

75. Swisher, supra note 69.

76. Josh Kosman, Facebook Boasted of Buying Instagram to Kill the Competition: Sources, N.Y. Post (Feb. 26, 2019), https://nypost.com/2019/02/26/facebook-boasted-of-buying-instagram-to-kill-the-competition-sources [https://perma.cc/E4QG-Y3S9] (reporting the contents of a document uncovered during FTC review of the transaction).

77. Malik, supra note 74.

78. Press Release, FTC, FTC Closes Its Investigation into Facebook's Proposed Acquisition of Instagram Photo Sharing Program (Aug. 22, 2012), https://www.ftc.gov/news-events/press-releases/2012/08/ftc-closes-its-investigation-facebooks-proposed-acquisition [https://perma.cc/J6YC-44GG].

79. 15 U.S.C. § 2 (2012).

80. United States v. Microsoft Corp. (*Microsoft II*), 253 F.3d 34 (D.C. Cir. 2001) (en banc) (per curiam).

81. Id. at 47.

82. Memorandum from Bill Gates to Exec. Staff of Microsoft Corp. 1 (May 26, 1995), https://www.justice.gov/sites/default/files/atr/legacy/2006/03/03/20.pdf [https://perma.cc/Y3Q9-CU64].

Windows.[83] Following a bench trial, the district court held that Microsoft had committed various acts, such as the suppression of browser distribution, to improperly neutralize the Netscape threat and maintain its monopoly.[84] The D.C. Circuit affirmed certain elements of the liability determination, while reversing on others.[85]

The *Microsoft* precedent illuminates why the acquisition of a nascent competitor, made to acquire or maintain a monopoly, violates Section 2. Three features of Section 2 law, in the context of a government suit seeking injunctive relief, are particularly important. First, the competitive threat posed by the target need not be fully fledged. Netscape had not developed into a real operating system competitor and might never have done so. As the D.C. Circuit explained, the relevant question is whether the targets "reasonably constitut[e] nascent threats."[86] Second (and implied by the first point), the target need not operate in the same market as the monopolist. By way of illustration, Netscape did not make operating systems, and therefore was not a participant in the relevant market of Intel-compatible PC operating systems.

Third, monopolizing conduct can take the form of collaboration rather than pure exclusion. The typical monopolization case focuses on exclusionary conduct that harms a rival, and here too *Microsoft* is exemplary. But Section 2 also reaches acquisitions and horizontal agreements, such as an agreement to divide markets.[87] A famous example is the consolidation of market power by Standard Oil.[88] If Microsoft had acquired Netscape rather than, say, acting to suppress browser distribution, that acquisition would violate Section 2. In fact, at one point, Microsoft apparently approached Netscape about buying or licensing Netscape's browser code[89] and later sought a market allocation arrangement in

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83. *Microsoft II*, 253 F.3d at 53–54 (assessing the perceived threat to Microsoft posed by Netscape's browser).

84. Id. at 45.

85. Id. at 46.

86. Id. at 79.

87. See, e.g., IV Phillip E. Areeda & Herbert Hovenkamp, Antitrust Law: An Analysis of Antitrust Principles and Their Application ¶ 912b, at 92 (4th ed. 2016) (concluding that the acquisition of a nascent rival "tends to maintain a monopoly by cutting off an avenue of future competition before it has a chance to develop. As a result, condemnation under § 2 is appropriate").

88. Standard Oil Co. v. United States, 221 U.S. 1, 73–75 (1911) (agreeing with the court below that the 1899 consolidation of control in Standard Oil of New Jersey "operated to destroy the 'potentiality of competition' which otherwise would have existed"). The Supreme Court affirmed the lower court's conclusion that this conduct violated Sections 1 and 2 of the Sherman Act. Id. at 72–77.

89. Plaintiffs' Joint Proposed Findings of Fact ¶ 64.1, United States v. Microsoft Corp. (*Microsoft I*), 84 F. Supp. 2d 9 (D.D.C. 1999) (No. 98-1221), https://www.justice.gov/atr/us-v-microsoft-proposed-findings-fact-1 (on file with the *Columbia Law Review*) (citing deposition testimony of a Microsoft executive describing the 1994 overture, prior to Microsoft's full recognition of the browser threat, to license Netscape browser software); id. ¶ 64.2 (quoting a Netscape executive's testimony that Microsoft had "offered a flat fee of a couple of

which Netscape would cease competing for PC-compatible browser business.[90]

As a further example, antitrust enforcers recently applied Section 2 to the acquisition of a nascent competitor. The drug maker Questcor made an unpatented blockbuster drug treatment for infantile spasms.[91] A European treatment posed a competitive threat to Questcor's monopoly, a threat that was merely nascent because the drug was not approved in the United States.[92] Questcor bought the U.S. rights to the European treatment, outbidding several other would-be acquirers.[93] The FTC and several states challenged, as unlawful monopoly maintenance, the defensive acquisition of a nascent competitor. Ultimately, Questcor agreed to pay $100 million and to license the acquired drug to another manufacturer to settle the case.[94]

Section 2 is a suitable vehicle for challenging consummated mergers. An antitrust enforcer need not block a transaction beforehand; waiting is fully within its power. Antitrust law has a statute of limitations, but it is directed to damages, not injunctive relief.[95] Laches—an unreasonable delay in bringing the suit—is generally understood to apply to private parties,[96] not the government.[97] Moreover, challenging a

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million dollars to take us out of the game. And that would have killed our product in their space").

90. Id. ¶ 67 (describing evidence of a June 1995 meeting in which Microsoft proposed that Netscape not develop a browser for Windows 95); see also *Microsoft I*, 84 F. Supp. 2d at 30–33 (describing efforts to "[d]issuade Netscape from [d]eveloping Navigator as a [p]latform"); Email from Bill Gates to Paul Maritz (May 31, 1995), https://www.justice.gov/sites/default/files/atr/legacy/2006/03/03/22.pdf [https://perma.cc/8VD9-MH3G] ("I think there is a very powerful deal of some kind we can do with Netscape. . . . I would really like to see something like this happen!!"). Microsoft also discussed internally the possibility of investing in Netscape. Id. ("Of course, over time, we will compete on the servers, but we can help them a lot in the meantime. We could even pay them money as part of the deal, buying some piece of them or something.").

91. Complaint at 2, FTC v. Mallinckrodt ARD Inc., No. 1:17-cv-00120 (D.D.C. Jan. 18, 2017), https://www.ftc.gov/system/files/documents/cases/170118mallinckrodt_complaint_public.pdf [https://perma.cc/SG65-KUA5]. Questcor was subsequently acquired by Mallinckrodt. Id. at 4.

92. Id. at 2–3.

93. Id. at 9, 11–12.

94. Mallinckrodt Ard Inc. (Questcor Pharmaceuticals), FTC, https://www.ftc.gov/enforcement/cases-proceedings/1310172/mallinckrodt-ard-inc-questcor-pharmaceuticals [https://perma.cc/6866-3LHK] (last updated July 14, 2017).

95. 15 U.S.C. § 15b (2012) (establishing a four-year statute of limitations for suits seeking monetary damages); V Areeda & Hovenkamp, supra note 87, ¶ 1205b, at 309 ("[T]he four-year limitation applies only to damage suits, not to actions in equity.").

96. See Int'l Tel. & Tel. Corp. v. Gen. Tel. & Elecs. Corp., 518 F.2d 913, 926 (9th Cir. 1975) ("We hold that . . . the defense of laches is available in [Clayton Act] § 16 suits . . . ."); V Areeda & Hovenkamp, supra note 87, § 1205b, at 309 ("The merged firm might have the defense of laches against a private suit . . . .").

97. See *Int'l Tel. & Tel. Corp.*, 518 F.2d at 928 ("Laches cannot ordinarily be asserted against the sovereign."); United States v. Pennsalt Chems. Corp., 262 F. Supp. 101, 101

consummated transaction has a remedy—to undo the acquisition—that is closely connected to the nature of the unlawful conduct. This close connection sidesteps the concern, often raised in Section 2 cases, that a proposed remedy does not correspond closely enough to the established harm.[98]

The D.C. Circuit's language in *Microsoft* applies readily to today's online platforms: "[I]t would be inimical to the purpose of the Sherman Act to allow monopolists free rei[n] to squash nascent, albeit unproven, competitors at will—particularly in industries marked by rapid technological advance and frequent paradigm shifts."[99] As applied to the Instagram acquisition, the concern is that Facebook acquired a nascent, albeit unproven, competitor in social network services, thereby eliminating the risk of competition. Such an allegation, if ultimately supported by the facts, would be actionable under Section 2.

To make out a violation of Section 2, the enforcer would need to establish Facebook's monopoly power in a well-defined market[100]—for example, a market to provide social network services to users or a market for advertisements on social networks. The case would also entail an inquiry into anticompetitive effects[101]—for example, higher prices to advertisers and lower quality to users, in the form of more ads or less privacy protection. Facebook's demonstrated intent in acquiring Instagram, as established by documents or testimony, might furnish a further basis for inferring effect. The case might ultimately be strengthened and broadened if the facts showed that Facebook had engaged in a program of serial defensive acquisitions—for example, by purchasing the WhatsApp messaging service and perhaps other firms in order to neutralize the threat that they posed.[102]

(E.D. Pa. 1967) ("Laches is no defense in a suit by the government to vindicate a public right."); see also II Areeda & Hovenkamp, supra note 87, ¶ 320g, at 375 (describing this as the "usual proposition").

98. See Massachusetts v. Microsoft Corp., 373 F.3d 1199, 1231 (D.C. Cir. 2004) (en banc) (describing the concern that a "drastic remedy, such as divestiture would be inappropriate if Microsoft's dominant position in the operating system market could not be attributed to its unlawful conduct").

99. *Microsoft II*, 253 F.3d 34, 79 (D.C. Cir. 2001) (en banc) (per curiam).

100. See United States v. Grinnell Corp., 384 U.S. 563, 570–71 (1966) (requiring, as an element of the monopolization offense, "the possession of monopoly power in [a] relevant market").

101. *Microsoft II*, 253 F.3d at 58 ("[T]o be condemned as exclusionary, a monopolist's act must have an 'anticompetitive effect.' That is, it must harm the competitive *process* and thereby harm consumers.").

102. This analysis is confined to Facebook's acquisitions. For an argument that Facebook has engaged in a pattern of false statements and deceptive conduct, thereby violating Section 2, see generally Dina Srinivasan, The Antitrust Case Against Facebook: A Monopolist's Journey Towards Pervasive Surveillance in Spite of Consumers' Preference for Privacy, 16 Berkeley Bus. L.J. 39 (2019).

In response, Facebook might be expected to argue—as CEO Mark Zuckerberg has in fact asserted—that Instagram would not have become a success were it not for Facebook's acquisition.[103] However, this argument ignores the fact that Instagram had strong alternative sources of support at its disposal, including venture capital funding and an acquisition offer, which Instagram spurned in favor of Facebook.[104] A second response is that Facebook, not competition, can best provide the security and privacy that consumers demand. However, accepting such an argument as a defense to an antitrust claim would defeat the fundamental policy animating the Sherman Act. As the Supreme Court has explained, the "Act reflects a legislative judgment that, ultimately, competition will produce not only lower prices but also better goods and services. . . . [T]he statutory policy precludes inquiry into the question whether competition is good or bad."[105]

Section 2 is not the only way to analyze the acquisition of a nascent competitor. An alternative framework is Section 7 of the Clayton Act, which prohibits mergers whose effect "may be substantially to lessen competition, or to tend to create a monopoly."[106] Section 7 is the customary legal tool for evaluating mergers. A particular acquisition might violate only Section 2, only Section 7, or both. The answer to one does not dictate the answer to the other.

The bread-and-butter Section 7 case is a merger of existing rivals, in which the merger is alleged to lessen competition in one or more well-defined markets in which both firms compete. Applied to Instagram, such an inquiry might focus on whether the merger increased concentration[107] or removed head-to-head competition as to photo-sharing services or social network services. A clear affirmative answer would support antitrust liability.

However, analysis of a nascent competitor within the traditional Section 7 framework tends to raise certain difficulties. There may be ambiguity about whether the acquirer and target compete (or competed) in the same market, a question that is important to establish a presumption of illegality in Section 7 challenges to horizontal mergers.[108] Relatedly, the traditional Section 7 framework tends to focus attention on current competition between existing rivals, whereas Section 2 focuses directly on the core competitive concern—removal of a nascent threat. Finally, although an anticompetitive effect need not be established with

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103. The Aspen Inst., A Conversation with Mark Zuckerberg, YouTube (June 26, 2019), https://www.youtube.com/watch?v=uHk2WfL5Gs4 (on file with the *Columbia Law Review*).

104. See Swisher, supra note 69 (discussing acquisition offer from Twitter).

105. Nat'l Soc'y of Prof'l Eng'rs v. United States, 435 U.S. 679, 695 (1978).

106. 15 U.S.C. § 18 (2012).

107. See United States v. Phila. Nat'l Bank, 374 U.S. 321, 363 (1963) (describing a presumption of illegality for horizontal mergers that significantly increase concentration).

108. See id.

certainty in a Section 7 case,[109] judicial tolerance of uncertainty is expressed with greater clarity and prominence in the Section 2 context.[110] These differences tend to favor a Section 2 approach over a traditional Section 7 case.[111]

III. DISRUPTIVE INCUMBENTS

A. *Reconciling Arrow and Schumpeter: Innovation in Adjacent Markets*

A second, and underappreciated, source of platform competition comes from disruptive incumbents. As discussed in Part I, Arrow and others have explained why we might expect competition to spur innovation. A second strand of the economic literature, traceable to the work of Schumpeter, points the other way by making a positive association between innovation and incumbency. This association has ex ante and ex post components.

Ex ante, the prospect of acquiring market power elicits innovation. For example, Google developed a new algorithmic approach to identifying important web content, displacing earlier search technologies.[112] Amazon built a superior online retail product over time.[113] These developments were motivated in part by an expectation of future profits. Schumpeter emphasized the role of such profits as a means to "lure capital on to untried trails" and thereby foster creative destruction.[114] These examples illustrate the Supreme Court's conclusion that the prospect of

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109. See, e.g., United States v. Baker Hughes Inc., 908 F.2d 981, 984 (D.C. Cir. 1990) ("Section 7 involves *probabilities*, not certainties or possibilities.").

110. See supra note 86 and accompanying text.

111. An alternative approach to Section 7 would do without the presumption of illegality for certain horizontal mergers, asking instead whether the transaction "tend[s] to create a monopoly." 15 U.S.C. § 18. This approach would roughly track the Section 2 inquiry in substance.

112. See John Battelle, The Search: How Google and Its Rivals Rewrote the Rules of Business and Transformed Our Culture 73–77, 151 (2005).

113. See Letter from Jeffrey P. Bezos, Chief Exec. Officer, Amazon.com, Inc., to Shareholders (1997), https://ir.aboutamazon.com/static-files/589ab7fe-9362-4823-a8e5-901f6d3a0f00 [https://perma.cc/XT2R-PSSF] ("At this stage, we choose to prioritize growth because we believe that scale is central to achieving the potential of our business model.").

114. Joseph A. Schumpeter, Capitalism, Socialism, and Democracy 89 (3d ed. 1950) ("[L]argest-scale plans could . . . not materialize at all if it were not known from the outset that competition will be discouraged by heavy capital requirements or lack of experience, or that means are available to discourage or checkmate it so as to gain the time and space for further developments."). Schumpeter argued that innovators require the means to "safeguard" investment through "insuring or hedging," id. at 88, and that monopoly is valuable as protection "against temporary disorganization of the market," id. at 103. This point is echoed in Peter Thiel, Zero to One: Notes on Startups, or How to Build the Future 33 (2014) ("[T]he promise of years or even decades of monopoly profits provides a powerful incentive to innovate.").

achieving a monopoly is valuable because "it induces risk taking that produces innovation and economic growth."[115]

The strong ex ante incentive to innovate identified by Schumpeter is consistent with the weak ex post innovation incentives identified by Arrow.[116] An entrant might work hard to attain a monopoly, and then, upon achieving it, turn to the quiet life. That consistency still leaves conflict at the level of antitrust or regulatory policies that facilitate the entry of outsiders. For example, prohibiting exclusionary conduct by a monopolist encourages entry by new competitors while simultaneously weakening the "pieces of armor" on which the incumbent's initial ex ante incentive might be partly based.[117] This tradeoff raises a question about how best to balance the two effects.[118]

Ex ante incentives are just one part of the Schumpeterian account. Schumpeter and others have argued that monopoly is also a potent platform for further innovation.[119] To be sure, some incumbents remain innovative even after they achieve a strong market position. For example,

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115. The Court stated:

> The mere possession of monopoly power, and the concomitant charging of monopoly prices, is not only not unlawful; it is an important element of the free-market system. 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 that produces innovation and economic growth.

Verizon Commc'ns Inc. v. Law Offices of Curtis V. Trinko, LLP, 540 U.S. 398, 407 (2004).

116. See, e.g., Carl Shapiro, Competition and Innovation: Did Arrow Hit the Bull's Eye?, *in* The Rate and Direction of Inventive Activity Revisited 361, 401 (Josh Lerner & Scott Stern eds., 2012) (emphasizing consistency between Arrow's view that "a firm with a vested interest in the status quo has a smaller incentive than a new entrant to develop . . . new technology that disrupts the status quo" and Schumpeter's view that "the prospect of obtaining market power is a necessary reward to innovation").

117. Schumpeter, supra note 114, at 89.

118. For arguments that antitrust enforcement is desirable from an innovation standpoint because it improves the Arrovian incentive more than it suppresses the Schumpeterian incentive, see, for example, Hemphill & Wu, supra note 62, at 1211–12 n.137 (arguing that "[w]here self-entrenchment excludes an innovator . . . [the] negative effect on the innovative entrant" is likely to dominate); see also Christina Bohannan & Herbert Hovenkamp, Creation Without Restraint: Promoting Liberty and Rivalry in Innovation 245–50 (2011) (collecting examples in which dominant firms have slowed innovation by obstructing the market entry of innovative outsiders); Jonathan B. Baker, Beyond Schumpeter vs. Arrow: How Antitrust Fosters Innovation, 74 Antitrust L.J. 575, 583–88 (2007) (surveying empirical literature about the opposing effects).

119. See Schumpeter, supra note 114, at 101 ("[T]here are advantages which, though not strictly unattainable on the competitive level of enterprise, are as a matter of effect secured only on the monopoly level . . . ."); F.M. Scherer, Schumpeter and Plausible Capitalism, 30 J. Econ. Literature 1416, 1418 (1992) ("Schumpeter went far beyond economists' long-accepted view that the *expectation* of a monopoly position . . . was necessary to make the venture worth while. Monopoly power *already held* also supported investment in technological progress."). In addition to Schumpeter, see, for example, Richard J. Gilbert & David M. G. Newbery, Preemptive Patenting and the Persistence of Monopoly, 72 Am. Econ. Rev. 514, 514 (1982) (offering a model of preemptive innovation by monopolists).

as discussed in Part I, leading platforms have aggressively adopted machine learning techniques to improve their matching algorithms and other aspects of their business. Incumbency may confer advantages in both the capacity and incentive to innovate. The advantages in capacity include superior personnel, greater financial resources, and the freedom to make long-term plans.[120] The incentive comes both from size—a large base over which to apply an improvement—and market power that allows the firm to appropriate the returns from further improvements.[121]

These ex post effects of incumbency run contrary to the Arrow replacement effect. However, there is an important and neglected point of reconciliation between the two perspectives. Arrow and Schumpeter coincide in their attitude toward innovative efforts *outside the home market* of the incumbent. Arrow's point is about innovation that cannibalizes the monopoly; the incentive to innovate in other markets is undiminished. Schumpeter's main focus, in its ex post component, is innovation (whether cannibalizing or not) that takes advantage of the incumbent's distinctive capacity. Thus, pursuing innovation outside the home market harnesses a variety of Schumpeterian advantages while avoiding the pitfalls of Arrow's replacement effect.[122]

This reconciliation is illustrated by leading platforms' aggressive forays outside of their home markets. For example, as noted in Part I, Amazon has built AWS into an important business selling storage and computing power to other firms.[123] Alphabet has undertaken an enormous effort to develop an autonomous vehicle. This research and commercialization effort is currently centered in Alphabet's Waymo subsidiary.[124] If successful, this project may upend the existing businesses of logistics, transportation services, and car manufacturing.[125]

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120. See Schumpeter, supra note 114, at 101–03 (discussing advantages of "brains," "higher financial standing," and "space . . . for long-range planning"). Franklin Fisher and Peter Temin usefully labeled this the "supply of innovations" argument (as distinct from the incentives-based "demand for innovations" argument). Franklin M. Fisher & Peter Temin, Returns to Scale in Research and Development: What Does the Schumpeterian Hypothesis Imply?, 81 J. Pol. Econ. 56, 57 (1973); see also Thiel, supra note 114, at 33 ("[M]onopolies can keep innovating because profits enable them to make the long-term plans and to finance the ambitious research projects that firms locked in competition can't dream of.").

121. See, e.g., Baker, supra note 118, at 578 (explaining this incentive).

122. Cf. Timothy F. Bresnahan & Shane Greenstein, Technological Competition and the Structure of the Computer Industry, 47 J. Indus. Econ. 1, 3 (1999) (describing divided technical leadership, wherein different firms furnish components of a platform, as an important source of innovative entry).

123. See Amazon 2018 Annual Report, supra note 13, at 23–24 (reporting $7.3 billion in operating income and $25.7 billion in net sales from AWS in 2018).

124. See Matthew DeBord, Waymo Could Be Worth as Much [as] $175 Billion—Here's a Brief History of the Google Car Project, Bus. Insider (Sept. 9, 2018), https://www.businessinsider.com/google-car-project-history-2018-8 [https://perma.cc/E98C-BKUU] (describing this effort).

125. See id. (discussing Waymo's ambitions).

AWS and Waymo also illustrate a complementarity in production, whereby a large firm's core operations create capabilities that are profitably deployed elsewhere.[126] AWS began as an incidental byproduct of Amazon's effort in the early 2000s to improve certain aspects of its internal business processes.[127] The resulting improvements enabled Amazon to market its computing capabilities to other firms.[128] As for Waymo, machine learning is central to the development of its autonomous vehicle,[129] and Waymo has deployed deep-learning expertise developed in Google's core search business to solve certain technical challenges.[130] Moreover, Google serves as a supplier of machine learning software and specialized hardware to Waymo.[131]

Waymo further illustrates the freedom to make long-term plans emphasized by Schumpeter and others.[132] Waymo is a result of Alphabet's research lab, a modern-day version of the corporate research labs that played an important role in twentieth-century innovation.[133] The most

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126. See Paul Krugman, Robin Wells & Kathryn Graddy, Essentials of Economics 77 (2d ed. 2010) (defining complements in production). For example, natural gas is collected as a by-product of crude oil production, and sawdust (used in particleboard) is produced as a by-product of logging. The same term can refer instead to a variant of complementary demand in which multiple inputs are necessary to produce a product (such as fuel and airplanes for an airline). See, e.g., Daniel F. Spulber, Global Competitive Strategy 56 (2007) (using this definition).

A further supply-side complementarity is spare labor capacity, particularly scarce technical employees whose retention may require the leeway to spend part of their time on whatever interests them. In that case, the workers' preferences effectively lower the marginal cost of additional innovation. An example is the "20% time" historically granted by Google to pursue projects outside an employee's core responsibilities, leading to AdSense, Gmail, and Street View. See Christopher Mims, Google's "20% Time," Which Brought You Gmail and AdSense, Is Now as Good as Dead, Quartz (Aug. 16, 2013), https://qz.com/115831/googles-20-time-which-brought-you-gmail-and-adsense-is-now-as-good-as-dead [https://perma.cc/9LLK-VQSU].

127. See Ron Miller, How AWS Came to Be, TechCrunch (July 2, 2016), https://techcrunch.com/2016/07/02/andy-jassys-brief-history-of-the-genesis-of-aws [https://perma.cc/QJ4U-LB8J] ("The internal teams at Amazon required a set of common infrastructure services everyone could access without reinventing the wheel every time, and that's precisely what Amazon set out to build—and that's when they began to realize they might have something bigger.").

128. See id.

129. See Dmitri Dolgov, Google I/O Recap: Turning Self-Driving Cars from Science Fiction into Reality with the Help of AI, Medium (May 8, 2018), https://medium.com/waymo/google-i-o-recap-turning-self-driving-cars-from-science-fiction-into-reality-with-the-help-of-ai-89dded40c63 [https://perma.cc/4D2M-8847] ("AI plays a crucial role in nearly every part of [Waymo's] self-driving system.").

130. Id. (describing the "jump-start" Waymo gained by applying Google's deep-learning research to the problem of pedestrian detection).

131. Id. ("At Waymo, we use the TensorFlow ecosystem and Google's data centers—including TPUs [a type of custom hardware]—to train our neural networks.").

132. See supra note 120 and accompanying text.

133. Early examples include General Electric (1901), DuPont (1902), Parke-Davis (1902), the Bell System (1911), and Kodak (1913). See George Basalla, The Evolution of

famous example is AT&T's Bell Labs, which simultaneously pursued basic science and innovations with a clear connection to AT&T operations, such as the development of the transistor.[134] It is not always clear—or, given the nature of the work, even knowable—whether such investments are rational from the standpoint of maximizing shareholder value. But their potential to alter the competitive conditions outside the incumbent's home market is undeniable.

B. *Platforms Targeting Platforms*

A special case of innovation and competition outside the home market is particularly relevant for our purposes: where one incumbent platform launches an attack on the core business of another. In recent years, there has been a remarkable variety of efforts by the leading tech firms to compete in one another's core businesses.[135] For example, Google has challenged Amazon in shopping starts (Google Shopping, among other efforts),[136] Facebook in social network services (Google+),[137] Apple in smartphone software (Android),[138] and Microsoft in productivity and operating system software (Google Docs, Gmail, Chrome).[139]

Technology 125–26 (1988) ("The first firms to engage in organized research were those whose technologies were closely linked to two areas of science that flourished in the late nineteenth century, chemistry and electricity.").

134. See Tim Wu, The Master Switch: The Rise and Fall of Information Empires 104–07 (2010) (discussing, among other Bell Labs breakthroughs, the invention of the transistor). Bell researchers also discovered background radiation that helped to confirm the Big Bang theory. See James E. McClellan III & Harold Dorn, Science and Technology, *in* World History 374–75 (2d ed. 2006). Bell researcher Claude Shannon's work on information theory laid the groundwork for a revolution in digitization and signal processing. See Jon Gertner, The Idea Factory: Bell Labs and the Great Age of American Innovation 115–35 (2012) (discussing this work and its influence).

135. See David S. Evans, Why the Dynamics of Competition for Online Platforms Leads to Sleepless Nights, but Not Sleepy Monopolies 22 (Aug. 23, 2017) (unpublished manuscript) (on file with the *Columbia Law Review*) ("Unlike the largest firms at previous points in time, these large Internet firms compete with each other across a range of products and services, despite each having gotten a toehold in the digital economy doing completely different things from one another.").

136. See Claire Cain Miller & Stephanie Clifford, Google Struggles to Unseat Amazon as the Web's Most Popular Mall, N.Y. Times (Sept. 9, 2012), https://www.nytimes.com/2012/09/10/technology/google-shopping-competition-amazon-charging-retailers.html [https://perma.cc/KF4R-QFQB] ("Google is a search engine, not a store, but it is increasingly inching into e-commerce with products like its comparison-shopping service, Google Shopping.").

137. See Farhad Manjoo, The Great Tech War of 2012, Fast Company (Oct. 19, 2011), https://www.fastcompany.com/1784824/great-tech-war-2012 [https://perma.cc/XV6P-D6GW].

138. See id.

139. Nick Wingfield, Windows 10 Signifies Microsoft's Shift in Strategy, N.Y. Times (July 19, 2015), https://www.nytimes.com/2015/07/20/technology/windows-10-signifies-microsofts-shift-in-strategy.html [https://perma.cc/A86L-RNRY] (attributing Microsoft's decision to offer a Windows 10 upgrade and a mobile version of Office for free to the fact

Such challenges are a potentially powerful source of platform competition and innovation. They harness the Schumpeterian capabilities identified in the previous section, without the incentives drag of the Arrow replacement effect. Indeed, as noted in the Introduction, an incumbent has an affirmative motivation to enter and compete in certain adjacent markets. In particular, an incumbent with market power has an affirmative preference for more intense competition in complementary products.[140] If the price of nails falls, demand for hammers increases. Thus, a producer of hammers has an incentive to arrange, if it can, a decrease in the price of nails.

One familiar application of the complementary demand effect is that manufacturers prefer more intense competition among distributors, and vice versa.[141] This preference helps to explain Google's investments to increase competition downstream in the provision of broadband internet service,[142] and Amazon's investments to increase competition upstream in book publishing.[143] But the point applies more broadly.

The complementary demand effect encourages entry on the margin that would be unprofitable for an ordinary firm. In the extreme case, an incumbent might be willing to introduce or sponsor competition that eliminates profits in the complementary market entirely. This incentive depends upon market power in the home market, in order to internalize the positive externality created by introducing new competition. Moreover, the larger the incumbent's share in the home market, the larger the effect.[144] Google sees a larger benefit from lower broadband prices than Bing. Amazon, compared to smaller retailers, sees a larger gain from intensified competition among publishers.[145]

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that "[c]ompanies like Google have crept into Microsoft's business with free software and services subsidized by its huge advertising business").

140. Goods are complements when a fall in one good's price increases demand for the other.

141. See Cont'l Television, Inc. v. GTE Sylvania Inc., 433 U.S. 36, 56 & n.24 (1977) (discussing a manufacturer's interest in low retail prices to minimize the cost of distribution).

142. Experimenting with New Ways to Make Broadband Better, Faster, and More Available, Google Pub. Pol'y Blog (Feb. 10, 2010), https://publicpolicy.googleblog.com/2010/02/experimenting-with-new-ways-to-make.html [https://perma.cc/NQ74-JA76] (describing Google's investment in new broadband infrastructure).

143. See Kindle Direct Publishing, Amazon, https://kdp.amazon.com [https://perma.cc/2Q96-EMY3] (last visited Sept. 30, 2019). Moreover, in 2009, Amazon entered the traditional full-service publishing business with new imprints that hewed closely to the traditional model, including advances to authors, editorial services, and distribution to bookstores. See About Us, Amazon Publ'g, https://amazonpublishing.amazon.com/about-us.html [https://perma.cc/9FSW-VKF9] (last visited Sept. 30, 2019).

144. Here, market share serves not as a proxy for market power but as a measure of the gains from introducing competition in a complementary business.

145. Note that for increased competition upstream, the relevant question is the incumbent's share of purchases of the key input—in this case, books. A monopolist in a local output market, with only a small share of purchases of an input, might have little

One particularly successful instance of cross-market entry is Google's development of Android. In 2005, Google acquired Android Inc. and proceeded to make various investments to improve its smartphone operating system.[146] Following Apple's release of the iPhone in 2007,[147] Android development focused on touchscreen interfaces.[148] Android's release in the following year enabled handset manufacturers to offer a competitive alternative to the iPhone (and its iOS operating system) without developing their own software.[149] Reflecting the competition between Android and Apple, Google's CEO resigned from the Apple board.[150] Today, Android is the leading operating system by volume and offers the primary competition to the iPhone platform.[151]

The Android example illustrates several benefits of cross-market disruption. First, entry increases product variety and expands consumer choice. Apple and Android phones are differentiated in features and style.[152] Second, entry constrains prices by satisfying demand at a lower

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incentive to introduce competition upstream. Thus, the incentives of two firms to introduce competition in one another's markets may be highly asymmetric.

146. Farhad Manjoo, A Murky Road Ahead for Android, Despite Market Dominance, N.Y. Times (May 27, 2015), https://www.nytimes.com/2015/05/28/technology/personaltech/a-murky-road-ahead-for-android-despite-market-dominance.html [https://perma.cc/FA33-3F5D].

147. See Jeremy W. Peters, Long-Awaited iPhone Goes on Sale, N.Y. Times (June 29, 2007), https://www.nytimes.com/2007/06/29/technology/29cnd-phone.html [https://perma.cc/C5D6-NN8N].

148. Richard Gao, Android and Its First Purchasable Product, the T-Mobile G1, Celebrate Their 8th Birthdays Today, Android Police (Sept. 23, 2016), https://www.androidpolice.com/2016/09/23/android-first-purchasable-product-t-mobile-g1-celebrate-8th-birthdays-today [https://perma.cc/N7HM-BRKU] (noting touch-screen functionality of the first Android device); see also Michael Simon, 10 Years Ago We Met the World's First Android Phone, and It Didn't Have a Headphone Jack, PCWorld (Sept. 23, 2018), https://www.pcworld.com/article/3308157/first-android-phone-t-mobile-g1-10th-anniversary.html [https://perma.cc/6NZB-J2HJ] (describing the competition in 2018 between the iPhone and the first Android phone).

149. 10 Years Later, Android Operating System Continues to Lead the Competition (Infographic), Dig. Info. World (Sept. 26, 2018), https://www.digitalinformationworld.com/2018/09/smartphone-operating-system-market-share.html [https://perma.cc/74H8-TKJS] ("Google's open approach to building a mobile platform . . . proved to be successful and it took less than three years for Android to become the number 1 platform in the booming smartphone market . . . with sales surpassing one billion for the first time in 2014.").

150. John Quitner, Why Google's Schmidt Resigned from Apple's Board, Time (Aug. 3, 2009), https://content.time.com/time/business/article/0,8599,1914350,00.html [https://perma.cc/44F8-6UJ6].

151. Mobile Operating System Market Share Worldwide, Statcounter Glob. Stats, https://gs.statcounter.com/os-market-share/mobile/worldwide [https://perma.cc/QF8P-5586] (last visited Sept. 30, 2019) (reporting 76% and 22% market shares for Android and Apple/iOS, respectively).

152. See, e.g., Android 10, Android, https://www.android.com/android-10 [https://perma.cc/VS37-BWVA] (last visited Sept. 30, 2019) (highlighting Android advantages); Apple Switch Page, Apple, https://apple.com/switch [https://perma.cc/FJ4Z-BRNF] (last visited Sept. 30, 2019) (highlighting iPhone advantages).

price and placing downward pressure on iPhone prices.[153] Third, entry places pressure on firms in the targeted market to innovate in return. For example, after Android's success offering larger phones, Apple followed suit, abandoning its earlier resistance.[154]

Cross-market entry has also targeted the leading online platforms, seeking to provide competition for Google in search, Facebook in social network services, and Amazon in shopping. For example, Microsoft has made a heavy investment in search with Bing. Google attempted entry into social network services with Google+. And Google has taken on Amazon with a series of specialized product search and search advertising offerings.

The results have been mixed. First, consider Bing, which entered the search business in a big way in 2009. A massive investment, supported in part by a flow of user queries encouraged by Microsoft software products, made Bing a significant competitor in the United States, with a 25% share of queries as of April 2019.[155] Google's U.S. query share has remained steady at just over 60%;[156] globally, its share of queries is higher.[157]

Google's entry into social network services was regarded by Facebook as an existential threat and has been credited with causing Facebook to increase its focus on "reliability" and "user experience," as opposed to the "move fast and break things" approach that characterized its early history.[158] Ultimately, Google+ was a failure, despite Google's efforts to encourage its user base to adopt it.[159]

In its competition with Amazon (and others) to be the starting place for shopping starts, Google has deployed a variety of offerings. Starting in

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153. Android Pressures Apple on iPhone Pricing, Forbes (Apr. 28, 2011), https://www.forbes.com/sites/greatspeculations/2011/04/28/android-pressures-apple-on-iphone-pricing (on file with the *Columbia Law Review*).

154. Jim Edwards, Steve Jobs Turned Out to Be Completely Wrong About the Key Reason People Like the iPhone, Bus. Insider (Sept. 12, 2014), https://www.businessinsider.com/steve-jobs-was-wrong-about-big-phones-2014-9 [https://perma.cc/QTJ5-QDAY] (noting Apple's change of heart, despite its earlier dismissal of larger phones).

155. Share of Search Queries Handled by Leading U.S. Search Engine Providers as of April 2019, Statista, https://www.statista.com/statistics/267161/market-share-of-searchengines-in-the-united-states (on file with the *Columbia Law Review*) (last visited Sept. 30, 2019) (reporting comScore data).

156. Id.

157. See Daisuke Wakabayashi & Cecilia Kang, It's Google's Turn in Washington's Glare, N.Y. Times (Sept. 26, 2018), https://www.nytimes.com/2018/09/26/technology/google-conservatives-washington.html [https://perma.cc/CV9P-C4KY] (stating that Google "has 90 percent of the global search market").

158. Antonio García Martínez, Chaos Monkeys: Obscene Fortune and Random Failure in Silicon Valley 285 (2016).

159. Jon Brodkin, Google Doubles Plus Membership with Brute-Force Signup Process, Ars Technica (Jan. 22, 2012), https://arstechnica.com/gadgets/2012/01/google-doubles-plus-membership-with-brute-force-signup-process [https://perma.cc/2RUV-PY5L] (discussing a Google product redesign that made it difficult to create a Google account without signing up for Google+).

2007, Google introduced "universal" search, in which specialized search results were blended in among the other results on the search engine results page (SERP).[160] The product universals pointed to third-party merchants offering the product for sale. Google displayed its specialized shopping search results prominently. Prominence matters because the higher a link is displayed on the SERP, the more traffic it receives. For example, at some points, prominent placement was triggered by the presence of an Amazon product listing among the top organic results.[161] One effect was to encourage shopping starts from Google's search page.

Later, Google replaced the product universals with specialized product ads that, if clicked, take the user to a third-party merchant's website. Google's evolving efforts in shopping are a form of disruptive innovation that has provided important competition to Amazon. Notwithstanding these efforts, Amazon is the current leader in product searches.[162]

C. *Protecting "Punching Up"*

These efforts by leading platforms to compete in each other's core businesses are socially valuable. Their importance is heightened when the adjacent incumbent is a uniquely plausible competitor. Such unique status is more likely when the targeted business is occupied by a powerful, entrenched incumbent, and the necessary scale of entry is difficult to develop from scratch. The leading platforms—Google in search, Facebook in social network services, Amazon in shopping—all fit the bill.

The potential value of entry by an adjacent incumbent is worth protecting on the margin, particularly when the target's market power is highly durable. It is a reason for antitrust enforcement to tread carefully when it comes to platforms attacking platforms. Thus, an enforcer might decline to intervene, in the exercise of prosecutorial discretion, if a platform uses its strength in one business in order to more effectively compete in another against the targeted platform.

This suggestion, at first blush, might seem contrary to the usual intuition in antitrust enforcement that a powerful incumbent should be kept on a tight rein. However, it builds upon the recognition that certain conduct by a firm with market power, otherwise unlawful, is permissible in

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160. See Google: Universal Search, Search Engine Land, https://searchengineland.com/library/google/google-universal-search [https://perma.cc/5SPU-733H] (last visited Sept. 30, 2019).

161. This point was disclosed in an FTC staff report that was inadvertently released in part. See Memorandum to the Federal Trade Commission, Bureau of Competition 130 n.136 (Aug. 8, 2012), https://www.benedelman.org/pdf/ftc-google-8aug2012.pdf (on file with the *Columbia Law Review*) [hereinafter Google Staff Memo].

162. Jumpshot, Inc., The Competitive State of eCommerce Marketplaces: Data Report Q2 2018, at 17 (2018), https://go.jumpshot.com/rs/677-KZC-213/images/Jumpshot-Q2-Data-Report.pdf [https://perma.cc/H2NR-V8B4] (showing a 54/46 split favoring Amazon in 2018, compared to a 54/46 split favoring Google in 2015). Amazon has also become an increasingly important source of competition in product advertising. Id. at 20.

support of breaking into a new market. In particular, a firm with market power may tie a second product or service to one in which the firm enjoys market power, and defend on the ground that the conditional sale strengthens a bid for new entry.[163] Ultimately, a lighter touch may offer a realistic path forward when there are no or few alternatives.

One plausible candidate for a lighter touch is Google's conduct related to product universals. In its pursuit of shopping starts, Google has competed not only with Amazon but also with comparison shopping engines (CSEs). CSEs are specialized, domain-specific search engines that present and compare prices of a product offered on various websites. CSEs received significant traffic from appearing in Google's organic listings. Google's placement of product universals resulted in promotion above CSEs.[164] Google also demoted CSEs within its ordinary SERP results.[165]

The antitrust concern raised by this conduct was that Google allegedly preserved a dominant position in search and search advertising by impeding the growth of businesses that could develop into significant competitors. According to critics, promoting its own product universals at the expense of CSEs denied users adequate access to CSE results that were preferred by users and harmed the CSEs by starving them of exposure to users. In 2017, the European Commission fined Google several billion dollars for its product universal conduct,[166] a decision that is currently on appeal.

This alleged conduct was investigated by the FTC, but ultimately FTC staff recommended against challenging the conduct as an antitrust violation.[167] One important reason is that the conduct lacked a clear anticompetitive effect.[168] Prominent placement of product universals, like other efforts to add "answers" in addition to lists of websites, arguably improved the search results. CSEs are not merchants but intermediaries that lead to merchants. Google's inclusion of product universals directly on the SERP sped up the user's connection to a merchant. On this view,

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163. Jefferson Par. Hosp. Dist. No. 2 v. Hyde, 466 U.S. 2, 23 n.39 (1984) (citing United States v. Jerrold Elecs. Corp., 187 F. Supp. 545, 555–58 (E.D. Pa. 1960)) ("[T]ying may be permissible when necessary to enable a new business to break into the market.").

164. Google Staff Memo, supra note 161, at 130 n.136 (summarizing testimony that "Google used the occurrence of [CSEs] at positions 1–3 in the web ranking to boost Google's product universal to position one"). The explanation given for this promotion was that a CSE's presence implied that a product universal would be relevant too, and that product universals were more useful than organic links to other CSEs (and hence presumably merited a higher position), an explanation that FTC staff concluded had "some force." Id. at 82.

165. See id. at 28.

166. See Google Shopping Decision, supra note 63, at 212.

167. See Google Staff Memo, supra note 161, at 86 (recommending against challenging this conduct given "legal hurdles" and "strong procompetitive justifications," while regarding the question as "close").

168. Id.

the product universals replaced CSEs that provided a low-quality user experience.[169] A further related impediment to enforcement is that U.S. antitrust law is reluctant to second-guess decisions about product design, for fear of false condemnations of beneficial product improvements.[170]

The foregoing analysis suggests a further justification for the FTC's nonenforcement against Google—that Google's conduct strengthened its ability to compete with Amazon for shopping starts. In other words, even if some consumers preferred CSEs and benefited from their prominent placement, this loss might be tolerable in order to promote the more important opportunity for Google to serve as a serious shopping competitor to Amazon.

Taking a step back from specific examples, as a general matter, today's competition among the leading tech firms is historically contingent and may be fragile. There is a risk that the leading firms might shift their strategy away from confrontation in favor of détente. As both a practical and legal matter, it is difficult to force firms to compete if they prefer to sit tight. Thus, there is reason to hesitate before disrupting the currently favorable equilibrium, lest we end up with less competition rather than more.

To be clear, inaction has a downside. It might result in collateral damage to firms, such as CSEs, caught in the crossfire between platforms. Nor may this possible harm be dismissed without inquiry as merely the result of ordinary competition, or as harm to competitors without any consequence to consumers. A further problem is that the competition enabled by a lighter touch might not succeed. The evidence about platforms attacking platforms, judged in terms of outcomes, paints a mixed picture. So we need to be clear-eyed about the likelihood that this will really work.

An important limiting principle, in considering whether to adopt a lighter touch, is that the firm under examination must be engaged in "punching up"—that is, attempting to compete with a strong platform in an adjacent market. Bing, Google+, and Google's product universals are good examples, as is Apple's recent insistence that apps utilizing a Google or Facebook login must also implement Apple's new login process.[171] By contrast, consider Google's placement of universals in the context of local search. The conduct at issue was roughly analogous to pro-

169. For a contrary perspective, see Charles Duhigg, The Case Against Google, N.Y. Times (Feb. 20, 2018), https://www.nytimes.com/2018/02/20/magazine/the-case-against-google.html [https://perma.cc/Q3KJ-PMWV].

170. *Microsoft II*, 253 F.3d 34, 65 (D.C. Cir. 2001) (en banc) (per curiam) ("As a general rule, courts are properly very skeptical about claims that competition has been harmed by a dominant firm's product design changes.").

171. Updates to the App Store Review Guidelines, Apple (June 3, 2019), https://developer.apple.com/news/?id=06032019j [https://perma.cc/UP2M-NNA8].

duct universals.[172] Here, however, Google had no platform target on a par with Amazon. Where a firm under examination is punching down rather than up, the argument for a lighter touch presented here does not apply.

CONCLUSION

Nascent competitors and disruptive incumbents in adjacent markets are important sources of rivalry for the leading online platforms. Preserving these sources of competition has varying implications for antitrust policy and the role of antitrust enforcers. Nascent competitors require extra vigilance from enforcers to ensure that a far-seeing platform does not acquire the firm when its competitive significance is clear to the platform but not yet to enforcers. By contrast, competition from disruptive incumbents may be enhanced most effectively by adopting a measure of reserve.

172. See Michel Luca, Tim Wu & Yelp Data Science Team, Is Google Degrading Search? Consumer Harm from Universal Search, Berkeley Law (July 2015), https://www.law.berkeley.edu/wp-content/uploads/2015/04/Luca-Wu-Yelp-Is-Google-Degrading-Search-2015.pdf [https://perma.cc/Y4EF-K28W] (arguing that Google gives inferior placement to superior, independent providers of specialized search).