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Ecosystem Competition – Note by Daniel A. Crane

Hearing on Competition Economics of Digital Ecosystems

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*Ecosystem Competition*¹

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1. Conventional antitrust norms analyze market power—as a stepping stone to anticompetitive effects and, hence, prohibited conduct—from the perspective of product substitutability. Two goods or services are said to compete with one another when they are reasonably interchangeable from the perspective of consumers, or to put it in more formal economic terms, when there is cross-elasticity of demand between them.² Conversely, when two goods or services are not reasonably interchangeable, they are not horizontally related and are said not to compete with one another. Since a concern over horizontal agreements and horizontal effects dominate antitrust—courts even analyze vertical agreement or merger cases in terms of their horizontal effects—proof of effects among substitutable goods or services is a crucial touchstone of antitrust analysis.

2. This “substitutability” approach to understanding competition and market power fails to capture important economic phenomena when applied to platform markets or other complex and technologically evolving economic sectors featuring multiple potential value propositions for consumers. In such sectors, firms may compete aggressively against each other without offering substitutable products or services for sale. The rival firms may be “frenemies,” sharing simultaneously co-dependent and complementary but rivalrous goals,³ but they are not traditional competitors seeking to earn rents from the same sectoral node. Tech and media giants compete to commoditize. Players create products and services that commoditize the nodes of rivals. In turn, these firms isolate their own value propositions by simply neutralizing the unique offerings of others.

3. Let me offer the short version of three examples, one from the somewhat distant past, one from the fairly recent past, and one that is just beginning to emerge:

- In the late 1990s, Microsoft Corporation competed with Java programmers and other technology companies over the future of middleware and operating systems. Middleware and operating systems were not substitutable products—a consumer would not choose to run a computer without an operating system and only use middleware—but middleware did threaten to commoditize operating systems and shift most differentiated value from operating systems to programs.
- In the early 2000s, Apple Inc. and Amazon.com, Inc. competed aggressively in an ecosystem that included e-books, tablets or e-readers, and a host of related audio and visual products and services. Apple and Amazon did have some substitutable

¹ This short paper is adapted from Daniel A. Crane, *Ecosystem Competition and the Antitrust Laws*, 98 Neb. L. Rev. 412 (2019)

² See, for example, Commission Notice on the definition of relevant market for the purposes of Community competition law, 97/C 372/03, [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997Y1209\(01\)&from=DA](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31997Y1209(01)&from=DA) (“A relevant product market comprises all those products and/or services which are regarded as interchangeable or substitutable by the consumer, by reason of the products' characteristics, their prices and their intended use.”).

³ See ARIEL EZRACHI & MAURICE E. STUCKE, *VIRTUAL COMPETITION: THE PROMISE AND PERILS OF THE ALGORITHM-DRIVEN ECONOMY* 147 (2016).

offerings—both sold devices for reading books, for example—but competition in substitutable products only begins to explain the companies’ commercial antagonism. Amazon’s gambit was to perpetuate its control over online retail—the Kindle was essentially a device to lock customers into Amazon’s retail world. Apple, by contrast, sought to commoditize the retail function and created differentiated value in the physical device—the iPad.

- In the emerging ecosystem of connected and automated vehicles, there is intensive competition among a variety of different players to establish or disestablish nodes as value propositions. Traditional car companies wish to preserve the differentiated automobile as a value proposition sought by consumers. Robotic vehicle technology companies like Waymo LLC and some traditional OEMs like Bosch seek to commoditize the car itself and shift the value proposition to AV systems that are vehicle-brand-agnostic. Fleet operators like Uber Technologies, Inc. and Lyft, Inc. would prefer to commoditize the vehicle entirely and establish transportation services through robotaxi fleets as a value proposition. Finally, telecom or communications technology companies like Qualcomm Incorporated and Intel Corporation are pushing for the primary value node to reside not in either vehicles nor ride sharing services, but rather in the communications networks connecting vehicles to other vehicles, roadside infrastructure, or “the cloud.”
4. While these examples differ in important regards, each demonstrate ways in which a sectoral ecosystem may exhibit intensive competition among firms that do not necessarily offer substitutable products or services and hence fall outside of antitrust law’s preoccupation with horizontal competition.

Three Examples of Ecosystem Competition

1. Middleware and Operating Systems

5. My opening example concerns a puzzle at the center of *United States v. Microsoft Corp.*: how Microsoft could have violated Section 2 of the Sherman Act by deceiving Java developers into creating Windows-dependent applications, when Java and other forms of “middleware” —such as Netscape Navigator—were held not to reside in the relevant product market.⁴ Microsoft argued that its view that independent (i.e., platform-agnostic) middleware was a competitive threat implied that middleware was in the same relevant market as the Windows operating system. Hence, Microsoft did not possess monopoly power in the relevant market.⁵ The D.C. Circuit rejected this argument finding that, although Microsoft neutered middleware as a competitive threat to the Window’s monopoly, the relevant market should exclude middleware because consumers could not substitute middleware for an operating system.

6. The conventional reading of *Microsoft* is that the court excluded middleware from the market because it was not yet substitutable for an operating system from the perspective of customers even though Microsoft’s anticompetitive conduct allowed for this eventual possibility. But a somewhat different explanation is also possible: the development of

⁴ 253 F.3d 34 (D.C. Cir. 2001) (en banc) (per curiam).

⁵ *Id.* at 53 (“Microsoft argues that, because middleware could usurp the operating system’s platform function and might eventually take over other operating system functions (for instance, by controlling peripherals), the District Court erred in excluding Navigator and Java from the relevant market.”).

independent middleware could eventually commoditize the operating system by making software developers indifferent as to the operating system on which their programs would run, since all operating systems would equally function to expose the APIs chosen by the developers. In this story, middleware did not evolve to take the place of operating systems, it evolved toward commoditizing operating systems and transferring the differentiated value in computer programs to the programs (and programmers) themselves. Microsoft directed its allegedly anticompetitive scheme toward stifling a competitive threat that was not—and would not likely become—a substitute for what Microsoft produced, but nonetheless threatened to eliminate Microsoft’s monopoly power by shifting consumer value from operating systems to programs. The relevant competition occurred among ecosystem rivals who were vying for consumer dollars, but not necessarily vying to sell consumers the same things.

2. E-Books and Tablets

7. Our second example of ecosystem competition concerns the rivalry between Apple and Amazon that resulted in an unfavorable antitrust judgment against Apple shortly after Apple CEO Steve Jobs’ untimely passing. Apple and Amazon co-existed for years with relatively little commercial antagonism, but landed in a well-publicized skirmish over e-books in the second decade of the twenty-first century⁶—the result of the two companies’ core business models coming into conflict over whether distribution or device would be commoditized in the new digital world.

8. Although it has sprouted in many directions since its founding in 1994, Amazon’s core business has always been retail distribution. When the company moved into the sale of hardware with the introduction of the Kindle e-reader in 2007, it did so not to diversify its business, but rather to stimulate demand for retail sales of e-books. Amazon sold Kindles to entrench its core historic business, the online bookstore. Amazon reportedly loses money on every unit of hardware it sells.⁷ CEO Jeff Bezos admits: "We sell the hardware at our cost, so it is break-even on the hardware."⁸ The retail giant views the Kindle as a commodity delivery device for high-margin online content such as books and video content.

9. By contrast, since its founding in 1977, Apple has primarily been a hardware company, and entered retail markets largely to strengthen its position in personal device markets. When Apple launched the iTunes store in 2003 its primary goal was to sell iPods, not songs. Unlike Amazon’s entry into hardware, Apple’s entry into music retail was somewhat profitable.⁹ Nevertheless, the venture’s most important business function was to entrench Apple’s position in the digital player market even before the emergence of the smartphone and tablet. Similarly, when Apple launched the iBooks online bookstore in

⁶ The skirmish culminated in *United States v. Apple, Inc.*, 791 F.3d 290 (2d Cir. 2015).

⁷ See Kelly Clay, *Amazon Confirms It Makes No Profit on Kindles*, FORBES (Oct. 12, 2012, 01:10 AM), <https://www.forbes.com/sites/kellyclay/2012/10/12/amazon-confirms-it-makes-no-profit-on-kindles/#289953996b43> [<https://perma.cc/YJ2M-GN8W>]; Jay Yarow, *CHART OF THE DAY: How Much Money Amazon is Making from the Kindle*, BUSINESS INSIDER (Feb. 13, 2013, 4:20 PM), <https://www.businessinsider.com/chart-of-the-day-how-much-money-amazon-is-making-from-the-kindle-2013-2> [<https://perma.cc/M2AB-2PXQ>].

⁸ Clay, *supra* note 7.

⁹ See Philip Elmer-DeWitt, *How Much Revenue did iTunes Generate for Apple Last Quarter?*, FORTUNE (July 21, 2013), <http://fortune.com/2013/07/21/how-much-revenue-did-itunes-generate-for-apple-last-quarter/> [<https://perma.cc/JTC5-CKDT>].

2010 (subsequently renamed Apple Books), the company sought less to compete with Amazon as a book retailer than to strengthen its position in the tablet market. Notably, Apple designed tablets to displace the e-reader by offering a product that could perform many other functions in addition to displaying e-books. Apple does not disclose profitability by product line; however, book retailing is not likely a significant profit center for the company, particularly given its shrinking e-book market share and the company's decision to overhaul its online bookstore in 2018.¹⁰

10. The clash that ultimately resulted in a finding of antitrust liability against Apple showcases the intense competition to define value propositions in the e-books' ecosystem. With the emergence of e-books in 2007, Amazon sought to keep customers locked into its platform. It was willing to lose money on sales of e-books and Kindles to manage the transition from physical books to e-books in a way that kept customers buying books from Amazon. To do that, Amazon had to maintain an overwhelming share of the e-books' market—over ninety percent—to keep customers accustomed to the Kindle system. Working from a wholesale distribution model, Amazon licensed e-book distribution rights from the seven largest publishing houses and then sold them to customers often below its wholesale price—thus losing money on many transactions, but keeping customers loyal to the Kindle ecosystem.¹¹

11. In launching the iPad in 2010, Apple sought to break Amazon's grip over the e-books' ecosystem and to introduce a new technology—the personal tablet—as its value proposition. Hardware was not essential to Amazon's strategy—it never required customers to use a Kindle. Amazon had shown a willingness to develop applications that allowed customers to read books encoded in the proprietary Kindle formats (.azw, .kf8, and .kfz) on other devices, such as PCs and Macs and eventually other tablets and smartphones. Amazon's primary goal was to ensure that customers transacted the retail function through Amazon (i.e., bought from Amazon as a retailer in the Kindle format). Apple, by contrast, intended to commoditize this same retail distribution function and accentuate the tablet. To do so, Apple had to create competition in e-book distribution. So, it launched the Apple iBooks store. In contrast to Amazon's insistence on proprietary e-book formats, Apple made its books available in an open format.¹² E-books would be a commodity—the device on which customers read them would matter far more.

12. In its attempt to unseat Amazon's e-books dominance, Apple found a willing alliance in book publishers that were concerned that Amazon was permanently devaluing book content by selling e-books at below-cost prices. By leveraging the joint power of the book publishers, Steve Jobs disposed of the wholesale model for e-book distribution and flipped instead to an agency model in which the book publishers, rather than Amazon, would set the retail price (and Amazon and Apple would collect a thirty percent distribution services fee). The U.S. Court of Appeals for the Second Circuit ultimately found this to be a form of horizontal price-fixing over a strong dissent by Judge Jacobs, who believed that Apple had acted procompetitively by organizing the book publishers to challenge Amazon's retail hegemony over e-books.

¹⁰ See Mark Gurman, *Apple's Getting Back into the E-books Fight Against Amazon*, BLOOMBERG (Jan 25, 2018, 5:00 AM), <https://www.bloomberg.com/news/articles/2018-01-25/apple-is-said-to-ready-revamped-e-books-push-against-amazon> [<https://perma.cc/9ASP-FF4V>] (reporting that Apple's e-book market share fell from 11% in October 2015 to 9% in February 2017).

¹¹ *Apple, Inc.*, 791 F.3d at 342 (Jacobs, J., dissenting).

¹² Chris Taylor, *Hey Apple, Here's How to Show the World You Love Books with iOS 12*, MASHABLE (July 3, 2019), <https://mashable.com/article/apple-books-preview-ios12/#L461HsOs8kqZ> [<https://perma.cc/39JD-GJD5>].

13. Amazon and Apple, with the aid of their respective allies, locked in an intense battle to define value propositions in the e-book ecosystem. The competitors were less interested in selling substitutable products (which they did to some extent), and instead sought to define the customer experience in how and what customers read. Amazon and Apple battled over whether a customer's critical purchasing decision was either where they bought an e-book or on what device they chose to read. This was an intense, largely non-horizontal technological and commercial competition between ecosystem rivals with important implications for consumer welfare.

3. Connected and Automated Vehicles

14. From the introduction of Ford's Model T until recently, the automobile ecosystem functioned under a stable model: manufacturers competed vigorously (at least since the emergence of European and Japanese competition in the 1980s) to roll out new models of automobiles—highly differentiated products whose features were at least tweaked in each model year and completely overhauled even within a model line every three or four years, need it or not. Manufacturers advertised intensely to consumers but distributed in most states only through independent franchised dealers because of state dealer protection laws.¹³ Putting aside rental fleets—which are mostly used by travelers on a short-term basis—cars are individually owned, maintained, and operated.

15. The automotive industry is leaving this model of individual ownership and operation of highly differentiated vehicles by the roadside and ushering in the first true revolution since the advent of the internal combustion engine. Electric motors and automated driving are beginning to displace internal combustion and the human behind the wheel. Connectivity among vehicles on the road (V2V), vehicles and roadside infrastructure (V2I), and vehicles and “everything” (V2X) through dedicated short range communications (DSRC) in the 5.9 GHz frequency or 5G telecommunications will make driving an activity centrally coordinated in real time, eliminating the individualistic model of driver-dominated decision-making. Companies expect customers to abandon individual vehicle ownership in favor of automated ridesharing.

16. In anticipation of these coming revolutionary trends, traditional car companies are attempting to shift their business model away from the traditional manufacturing and sales model into a “transportation-as-a-service” model. Ford Motor Company, Daimler AG, and General Motors Company have all announced plans to launch ride-sharing services in competition not only with Uber and Lyft, but also with technology companies like Alphabet's (Google's) Waymo unit. The entire competitive ecosystem is rapidly shifting:

[C]ompeting in the on-demand mobility market will pit legacy automakers against ride-hailing services from startups and tech giants that have far greater experience in acquiring and engaging consumers through digital channels. To succeed in what will likely be a hyper-competitive market for urban ride-hailing, automakers will have to foster new skill sets in their organizations, and transform from companies that primarily produce vehicles to ones that also manage vehicle fleets and customer relationships. That will entail competing with startups and tech giants for software development and data science talent, as well as reforming innovation

¹³ See Daniel A. Crane, *Tesla, Dealer Franchise Laws, and the Politics of Crony Capitalism*, 101 IOWA L. REV. 573 (2016).

*processes to keep pace with digital trendsetters. Automakers will also need to create unique mobile app and in-car experiences to lure customers.*¹⁴

17. Who are the competitors in this evolving ecosystem? Conventional models of substitutability do not begin to describe the competitive relationships that characterize this ecosystem. It is not just that car companies are being forced to become ride-sharing service providers and mobile app purveyors. Nor is it just that ride-sharing companies are heavily investing in automated technologies and product development and hence becoming more like car companies; that software firms like Google and Apple are making technological moves that make them increasingly look like Tier 1 OEMs; and that telecommunications companies are thinking about becoming transportation service providers. That perspective still imagines that competition occurs only when previously non-competitive companies transition into each other's spaces vie for customers' attention. Many of the most significant competitive dynamics in the connected and automated vehicle ecosystem occur among firms that are unlikely to sell substitutes or unlikely to define itself in the same relevant market through evidence of demand cross-elasticity. Uber and Lyft will unlikely become automobile manufacturers. Qualcomm may never administer a ride-sharing service. General Motors may never become a major app developer. And yet, all of these companies, and many others, are competing hard to define the value propositions in the connected and automated vehicle ecosystem.

18. The vectors of competition over which industry participants are vying are many. Will the automobile become a commodity—a fungible transportation pod whose brand the average consumer notices no more than the brand of the city bus or subway car—or will even the shared automated vehicle remain a differentiated status symbol and marker of personal identity? Will automated vehicle features and protocols become standardized through regulation or industry standard setting, or will AV technology suppliers continue to compete to offer differentiated products? Will communication among vehicles and roadside infrastructure become centrally defined and managed, with telecommunications services largely commoditized, or will competition among distinctive telecommunications networks play an important role in shaping the connected vehicle ecosystem?

19. It is too early to tell how these, and many related questions, will be answered, and not clear which firms have the interests to push for commoditization or differentiation as to which nodes of the ecosystem. What is certain, however, is that, as the ecosystem develops, there will be an intense rivalry to shape the ecosystem to their own commercial advantage, including among firms that are not conventional horizontal competitors.

20. This short paper has presented the case for considering competition beyond traditional market definition notions of substitutability. If accepted, this concept could have far-reaching implications for competition policy. The beginnings of that analysis is presented in the longer version of this paper, previously published in the *Nebraska Law Review*.

¹⁴ Bus. Insider Intelligence, *By the End of 2019, Waymo, Uber, and GM All Plan to Have Fleets of Autonomous Cars Providing On-Demand Rides — Here's How Automakers Can Compete*, BUS. INSIDER (Mar. 19, 2018, 10:02 AM), <https://www.businessinsider.com/the-autonomous-mobility-ecosystem-report-2018-3> [<https://perma.cc/UY9L-LW3C>].