A Dynamic Analysis of Broadband Competition: What Concentration Numbers Fail to Capture

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Introduction

The 117th Congress is considering whether to devote significant federal resources toward promoting broadband access in underserved communities. Legislative proposals to do so include President Joe Biden's draft American Jobs Plan—a $2.3 trillion budget-reconciliation package that sets aside $100 billion for broadband infrastructure.[1] They also include the Accessible, Affordable Internet for All Act, which would create a $79.5 billion federal program.[2]

The instinct to promote network buildout is understandable, particularly in the wake of the COVID-19 pandemic and the various socioeconomic disparities it highlighted. But precisely how that infrastructure funding is deployed will determine whether such proposals succeed or fail.

In fact, the U.S. broadband market is already healthy, and *in most cases*, competitive outcomes are close to optimal. Charges that broadband markets are dominated by monopolies or oligopolies and that they are therefore stagnant, over-priced, and of low quality do not comport with the empirical and economic realities. To take but one example, even with the overall rise of prices across the economy, and in the face of surging demand during the COVID-19 pandemic, U.S. broadband prices fell.[3]

Concentration is a poor predictor of competitiveness, and broadband markets with even a small number of competitors can be—and are—quite healthy. Indeed, the multi-year, multi-billion-dollar investment plans broadband firms execute—amid constant pressure from alternative modes of Internet access like 5G, fixed wireless, and satellite—tell the story of a highly competitive, dynamic market.

To be sure, there are a few areas where there has been *no* meaningful wireline broadband buildout: Approximately 4.4 percent of the U.S. population does not have access to at least 25/3 Mbps fixed service.[4] Even then, however, many of those areas are served by wireless Internet service providers (WISPs), cellular broadband, and/or satellite service.

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[1] Press Release, The White House, *FACT SHEET: The American Jobs Plan* (March 31, 2021), https://www.whitehouse.gov/briefing-room/statements-releases/2021/03/31/fact-sheet-the-american-jobs-plan.

[2] Accessible, Affordable Internet for All Act, H.R.1783, 117th Cong. § 1 (2021), *available at* https://www.congress.gov/117/bills/hr1783/BILLS-117hr1783ih.pdf.

[3] As US Telecom notes in its recent report, the price of the most popular broadband services fell by 7.5% year-over-year, and the highest speed plans fell by 2.3% year-over-year. Brian Weiss, *No Fluke: American Broadband Prices Continue Decline in 2021*, USTELECOM (May 26, 2021), https://www.ustelecom.org/no-fluke-american-broadband-prices-continue-decline-in-2021/

[4] As discussed below, the FCC currently defines 25/3 Mbps as "broadband"—and empirical studies demonstrate that, for all but the most demanding users, this is a good minimum service threshold. See, *infra*, nn. 9-14. Further, it is worth noting that these numbers incorporate only *fixed* connections and do not include potential intermodal competition from wireless services (which is increasingly a viable substitute for fixed service).

But while the digital divide—both rural and urban—may be real, that fact alone does not justify wholesale intervention into broadband markets. Instead, the actual scope of the problem should be assessed, and policies tailored to remedy specific needs. The policies required to reach that stubborn 4.4 percent tail of broadband rollout are likely to be very different than those that facilitated the buildout of the first 95.6 percent.

Policies designed to close the digital divide should have two broad features: they should reach consumers where they are, and they should not disrupt the otherwise healthy broadband market. Reaching consumers where they are means targeting subsidies directly to consumers to make it more viable for existing providers to build out into new areas. Such policies should be technology-neutral and designed to stimulate demand to jumpstart markets that have otherwise proven too costly for any provider to enter. Avoiding disruption of healthy markets entails refraining from interventions that artificially introduce new competitors, skew investment planning by broadband providers, or dictate how and where providers should build networks.

There is much that can be done to encourage better and timelier broadband rollout, but not all solutions are equally effective. As we detail below, policymakers must choose carefully among competing options to realize the best possible result.

This paper aims to address common misconceptions associated with broadband competition that, in turn, undercut practical solutions for connecting the unconnected. It first details some of those misconceptions and contrasts them with the realities of current broadband markets. It then provides an overview of how to properly understand healthy competition in local broadband markets. It then provides a critique of commonly advanced proposals that are based on fundamental misunderstandings of how broadband markets work. And finally, it offers an approach to policy that incorporates a variety of solutions for connecting the unconnected.

I. Misconceptions about the broadband market

Claims of weak competition in the broadband telecommunications market are rooted in misunderstandings of the economics of broadband deployment. Specifically, while the claims correctly detect a concentration trend among broadband providers in some cases,[5] they incorrectly assume that it therefore follows that *competition* has diminished. Even where concentration can be observed in broadband markets, there is scarce evidence it is correlated with negative outcomes, such as decreased productivity or increased quality-adjusted prices. Further, as discussed below, providers in the broadband market are engaged in "dynamic competition," in which economies of scale and superior efficiencies are the driving considerations. Dynamic markets dominated by superstar firms

[5] Critically, we are generally restricting our analysis to fixed wireline competitors because that is where critics of current broadband competitiveness restrict their attention. But it should be noted that wireless services (including fixed wireless, mobile wireless, and LEO satellite) are a viable alternative for an ever-increasing number of users. The true picture of broadband competitiveness, therefore, is both more complicated and more robust than even our analysis suggests.

differ in important ways from markets comprising numerous commodity-like providers. Thus, in order to evaluate policy prescriptions for the broadband market, it is essential first to place the market in its proper context.

A. Broadband competition and its critics

Criticisms of the current state of broadband deployment follow from a presumption of endemic market failure. Specifically, the critics believe that too few Americans have affordable[6] access to adequate broadband speed and capacity and that this, in turn, is the result of insufficient competition among broadband providers.[7] The 2020 Broadband for America's Future Report authored by Jonathan Sallet and published by the Benton Institute for Broadband & Society, for example, relied on broadband speed and availability data to construe markets in such a way as to suggest that 83 percent of the country is served by only one or two competitors.

The Federal Communications Commission (FCC) defines high-speed broadband as Internet service that offers download speeds of at least 25 Mbps and upload speeds of at least 3 Mbps—commonly styled as "25/3 Mbps" service.[8] Consumers with relatively simple needs can generally access the

[6] We discuss price below, but it is important to note that the primary claim takes its cue from Section 706 of the Telecommunications Act of 1996, which draws a connection between *deployment* and competition and, at best, is concerned with price only obliquely. Section 706 directs the FCC to "encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans… by… remov[ing] barriers to infrastructure investment." The focus is on deployment, and the concern is that insufficient competition might provide insufficient incentives for deployment. Thus, if the FCC finds deployment is not proceeding sufficiently, it is to "take immediate action to accelerate deployment of such capability by removing barriers to infrastructure investment and *by promoting competition in the telecommunications market*." 47 U.S.C. § 1312 (emphasis added). This is not to say that price is unimportant; indeed, a great number of legislative provisions and agency programs are concerned with affordability. But the predominant concern is the provision of service—indeed, affordability is irrelevant where broadband service cannot be had at any price, and, where it can, affordability can be far more readily and directly addressed through subsidies rather than the structural market interventions.

[7] *See, e.g.*, Jonathan Sallet, *Broadband for America's Future: A Vision for the 2020s*, Benton Institute for Broadband & Society (Oct. 2019) [*hereinafter* "Broadband for America's Future Report"], *available at* https://www.benton.org/sites/default/files/BBA_full_F5_10.30.pdf; *see also* Mara Faccio & Luigi Zingales, *Political Determinants of Competition in the Mobile Telecommunication Industry*, REV. FINANC. STUD. (*forthcoming*) (pre-publication draft dated Feb. 2019), *available at* https://faculty.chicagobooth.edu/-/media/faculty/luigi-zingales/research/faccio_zingales_02-01-2019.pdf (correlating market concentration and political influence with higher mobile prices and profit margins); Emily Stewart, *America's Monopoly Problem, Explained by Your Internet Bill*, VOX (Feb. 18, 2020), https://www.vox.com/the-goods/2020/2/18/21126347/antitrust-monopolies-internet-telecommunications-cheerleading. *See also* Sen. Amy Klobuchar, et al., Letter to Assistant Attorney General Makan Delrahim and FCC Chairman Ajit Pai, Klobuchar News Release (May 7, 2018), *available at* https://www.klobuchar.senate.gov/public/index.cfm/news-releases?ID=ABE6E9BE-72EC-459C-825A-A1D7F1FF0425 (expressing a belief that allowing the wireless market to merge from four to three competitors would result in higher prices to consumers or lack of access).

[8] *See* FCC, 2015 BROADBAND PROGRESS REPORT (2015), https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report (upgrading the standard speed from 4/1 Mbps to 25/3 Mbps) [hereinafter "2015 Broadband Progress Report"].

Internet productively with connections that offer 10/1 Mbps service.[9] This has proven true even in the wake of the COVID-19 pandemic, which has driven rising demand for broadband connections to facilitate remote work, education, health care, retail, and other uses.[10] While there is some demand for 100/10 Mbps or gigabit service from some users—such as enthusiasts of graphics-intensive streaming video games[11]—for most consumers of video streaming and other data-intensive applications, broadband connections that meet the FCC's definition are likely more than adequate. As Doug Brake of the Information Technology and Innovation Foundation puts it:

> Largely due to the writings of Harvard Law professor Susan Crawford, there is a pervasive myth in broadband policy that it is imperative the nation transitions to all-fiber gigabit. In fact, the speeds required to meaningfully participate in online activity are quite low, and the benefits of super-high speeds for average users are relatively marginal. For example, Zoom video recommend[s] 2 Mbps up and down stream. Google recommends a connection of 1 Mbps up and down for a low-definition video call, and 2.6 Mbps down and 3.2 Mbps up for high definition. This compared with the 1,000 Mbps advocates claim is necessary. Yes, more fiber is better, and the gradual transition to fiber—especially the replacement of the legacy copper network—is a good thing and should not be discouraged. But the benefits of all-fiber broadband do not justify the significant intervention at large cost some advocates have called for.[12]

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[9] *See, e.g.*, Tyler Cooper, *How Much Internet Speed Do I Need?*, BROADBANDNOW (Apr. 7, 2021), https://broadbandnow.com/guides/how-much-internet-speed-do-i-need (noting that, to check email and browse the web, 1-5 Mbps minimum download speeds are needed).

[10] *See* Broadband Internet Technical Advisory Group (BITAG), *2020 Pandemic Network Performance Report* (Apr. 5, 2021) at 24, *available at* https://www.bitag.org/documents/bitag_report.pdf [hereinafter "BITAG Pandemic Report"] ("The Internet in the United States has performed and continues to perform well during the pandemic, in the face of extraordinary and unprecedented changes in demand and use. This strong performance covers all of the connected parts of the Internet, from user applications to content distribution infrastructure, all types of Internet access networks, and everything in between. This is likely due to a combination of the nature of the design of the Internet itself, open and interoperable standards, competent technical and operational execution, and significant long-term investments across the entire Internet ecosystem. Infrastructure operators and network operators also responded rapidly to the sudden increase in application and network usage by quickly adding everything from server capacity to interconnection capacity, and last mile access network capacity at rates far beyond pre-pandemic levels.").

[11] And even then, network characteristics other than bandwidth—most notably, latency—may actually be driving preferences for higher data transfer speeds. The amount of available bandwidth affects latency, but the two are not identical. "While bandwidth is the amount of data that can be transmitted over a connection in a given amount of time, latency is the time it takes for a data packet to make the round trip between the user's computer and another computer, typically a server located somewhere else. Thus, speed as understood colloquially is not just bandwidth, but a combination of bandwidth and latency." Yu-Hsin Liu, Jeffrey Prince & Scott Wallsten, *Distinguishing Bandwidth and Latency in Households' Willingness-to-pay for Broadband Internet Speed*, 45 INF. ECON. POLICY 1, 1 (2018). According to this study, "households are willing to pay to avoid high latency levels," and "failing to account for latency increases measured WTP [willingness to pay] for download bandwidth . . . [, suggesting] that consumers may interpret download bandwidth as a proxy for the combined quality of download bandwidth and latency." *Id.* at 8.

[12] Doug Brake, *Lessons from the Pandemic: Broadband Policy After COVID-19*, ITIF (Jul. 13, 2020), https://itif.org/publications/2020/07/13/lessons-pandemic-broadband-policy-after-covid-19.

While Brake is referencing videoconferencing applications of the sort that proved essential for remote work during the COVID-19 pandemic, even when it comes to higher-definition livestreaming applications, users need far less upload than download speed. Even for the demanding use case of live-streaming video (e.g., Twitch or YouTube live broadcasting), a range of connection speeds suffice. Recommended upload speeds range from a minimum of 2 Mbps for a 720p video stream at 30 frames per second (fps), to a maximum of 61.5 Mbps for YouTube at the highest-level resolution and fps available, with other applications in the range of 5.6 to 7.4 Mbps.[13] The vast majority of users do not broadcast live, high-definition videos, of course, and typical usage needs are substantially less.

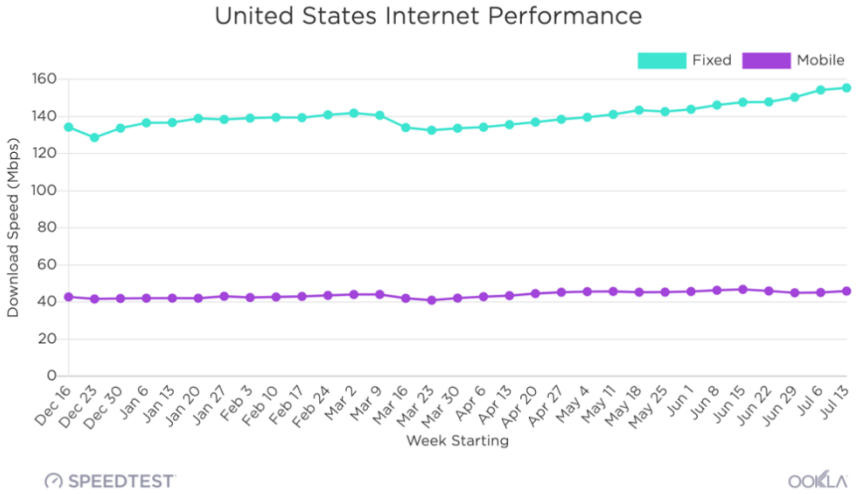
By these criteria, nearly the entire U.S. population has access to high-speed broadband. The FCC's most recent Broadband Deployment Report, published in January 2021, estimates that 95.6 percent of the population has access to at least 25/3 Mbps service, and 97 percent of the population has access to 10/1 Mbps service.[14] The average fixed broadband connection in the United States delivers more than 192 Mbps download service,[15] a substantial *increase* since the beginning of the pandemic.

[13] *See, e.g.*, Restream, *What is a Good Upload Speed for Streaming?* (Jun. 25, 2020), https://restream.io/blog/what-is-a-good-upload-speed-for-streaming/ (recommending upload speeds of 6 to 7 Mbps for Facebook Live, 5.6 to 7.4 Mbps for Twitch, and 24 to 61.5 Mbps for YouTube at the highest-level stream and frames-per-second available on each platform, respectively); Boxcast, *What Upload Speed Do I Need to Live Stream?* (May 8, 2019), https://www.box-cast.com/blog/what-upload-speed-do-i-need-to-stream (recommended upload speed of 13 Mbps for 1080p at 30 fps, with a minimum of 2.75 Mbps).

[14] *See* FCC, FOURTEENTH BROADBAND DEPLOYMENT REPORT (Jan. 19, 2021), *available at* https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf. Limitations to note: Facilities-based broadband providers report deployment data to the FCC using Form 477. Form 477 data is self-reported and resolves to the census block, which has its own limitations. Ultimately, the estimates won't be far off from 96%. *C.f.* FCC, *Form 477 Local Telephone Competition and Broadband Reporting Instructions*, OMB Control No. 3060-0816, https://us-fcc.app.box.com/v/Form477Instructions. *See also* FCC, *Communications Marketplace Report*, GN Docket No. 20-60, FCC 20-188 at ¶ 99 (Dec. 31, 2020), *available at* https://docs.fcc.gov/public/attachments/FCC-20-188A1.pdf [hereinafter "2020 Communications Marketplace Report"] (noting that the number of fixed residential connections has increased from 91 million in 2015 to 105 million in 2019).

[15] *United States's Mobile and Fixed Broadband Internet Speeds*, SPEEDTEST GLOBAL INDEX (last visited May 24, 2021), https://www.speedtest.net/global-index/united-states#fixed.

FIGURE ONE: Tracking COVID-19's Impact on Internet Performance[16]



While there is surely room to improve both the deployment and affordability of U.S. broadband, the vast majority of American citizens have access to some form of high-speed Internet. And, as discussed further below, broadband speeds are not the sole determinant of the adequacy of service. Rather, modern edge-computing services (e.g., Netflix) are engineered to adapt to network conditions, allowing superior service to be supplied to consumers across a wide range of connection speeds. At the same time, the most significant limitation on the adequacy of a user's service is often a function of equipment or service outside the ISP's control—including the user's own equipment, such as her modem or wireless router.[17]

> The weakest link in the value chain, as determined by speed or service quality, shapes the perceived consumer experience. If, for example, content is delivered by a content provider with low resolution, the consumer experience is impinged upon irrespective of the quality of the other elements of the value chain. Furthermore, the ISP does not necessarily own or control the whole underlying infrastructure. The various parts of the infrastructure used to deliver services to consumers may be owned by different companies, and vary in terms of the bandwidth available and how they treat products and

[16] *Tracking COVID-19's Impact on Global Internet Performance*, SPEEDTEST (last visited May 24, 2021), https://www.speedtest.net/insights/blog/tracking-covid-19-impact-global-internet-performance/#/United%20States. Note that this graph is only up to July 13, 2020. The growth has continued apace and, at time of writing, average speed is 191.97/67.8 Mbps for fixed broadband and 82.04/13.43 Mbps for mobile. *See United States's Mobile and Fixed Broadband Internet Speeds, id.*

[17] Volker Stocker & Jason Whalley, *Speed Isn't Everything: A Multi-criteria Analysis of the Broadband Consumer Experience in the UK*, 42 TELECOMM POLICY 1 (2018) ("[P]erformance in the home network by routers/modems or set-top boxes/SmartTVs might impede consumer experience as components might present barriers to exploit subscribed-to capacity usage.").

> services such as voice-over-IP (VOIP) or over-the-top (OTT) services. The consumer experience may also vary depending on the digital literacy of the user.[18]

By the same token, efforts to increase broadband network speeds would accomplish little if users' equipment and their ability to use it are not updated accordingly, as well.[19]

Although most critics acknowledge that high-speed broadband is available to the overwhelming majority of Americans, some—such as Susan Crawford of Harvard Law School—nevertheless contend that broadband infrastructure remains woefully inadequate as long as it is not "future proof."[20] By this, they mean that a broadband network is adequate only if and when fiber optic cable is laid, which would allow future information-carrying capacity to be upgraded without digging up and replacing the current network.[21] Moreover, despite the impressive reach of high-speed broadband, many critics focus instead on the lack of availability for the remaining 4.6 percent of the population, the prices at which service is offered, and whether existing broadband services in these areas will be able to cope with suddenly increased demand, particularly in the wake of the COVID-19 pandemic.

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[18] *Id.*

[19] *See, e.g.*, Torsten J. Gerpott, *Experienced Speeds of Fixed Internet Connections as Drivers of Customer Bonds with their Provider – An Empirical Study of Consumers in Germany*, 8 MANAG. SCI. LETT. 1239, 1254 (2018) ("WBC [wireline broadband connection] providers and consumer protection organizations alike should step up their efforts to explain clearly to Internet users that their WBC speed experiences do not only depend on the capacity of public telecommunications networks but also on a range of other factors, which private households can partially influence themselves. In this process, WBC providers in particular could support their customers with briefing information on how consumers ought to design their home networks and to select their terminal devices in a way that promotes the achievement of the desired speed experiences when accessing the Internet at home.").

[20] *See* SUSAN P. CRAWFORD, FIBER: THE COMING TECH REVOLUTION—AND WHY AMERICA MIGHT MISS IT (2019). This has been the case with every incarnation of the FCC's definition: when it was 200/200 Kbps download/upload speeds from 1996 until 2010; 4/1 Mbps download/upload speeds from 2010 until 2015; and finally, 25/3 download/upload speeds from 2015 through the present. *See* FCC, SIXTH BROADBAND DEPLOYMENT REPORT (2010), https://www.fcc.gov/reports-research/reports/broadband-progress-reports/sixth-broadband-progress-report (upgrading the standard speed from 200/200 kbps to 4/1 Mbps); 2015 BROADBAND PROGRESS REPORT, *supra* note 8, at 43 (upgrading the standard speed from 4/1 Mbps to 25/3 Mbps). Notably, manipulation of the adequacy of stated broadband speeds has been part of the justification for increased regulation, including the reclassification of broadband Internet access service as a Title II service. *See* Blair Levin & Larry Downes, *How Good is Your Broadband? The FCC Needs to Know*, THE WASHINGTON POST (Sep. 13, 2017), https://www.washingtonpost.com/news/innovations/wp/2017/09/13/how-good-is-your-broadband-the-fcc-needs-to-know/ ("As we see it, the problem isn't so much how the FCC defines broadband. The problem is that the FCC's annual report, by law, demands both a factual conclusion and a regulatory call to action. Depending on its findings, the agency is required to increase or decrease regulation. As a result, the temptation to slant the report's findings to support a broader agenda has proven difficult to resist. In 2015, for example, the previous FCC chairman, Tom Wheeler, more than doubled the standard for what counted as broadband, in part to reflect changing consumer expectations but in part to shore up his legal defense for his desired reclassification of ISPs as common carriers in the contentious Open Internet order. Raising the standard, the number of competing broadband providers in any given area fell precipitously. What previously seemed 'reasonable and timely' suddenly wasn't.").

[21] *See* Cory Doctorow, *America's Fiber Future: Susan Crawford on How America's Wired Future is Slipping Away*, BOINGBOING (Jan. 8, 2019), https://boingboing.net/2019/01/08/fiber-vs-america.html.

B. Counting competitors is a poor measure of competition

Counting competitors is never a reliable way to determine the extent of competition in any market, and this is particularly true in technology markets. In general, where a market is "contestable"—that is, where incumbent firms face potential competition from the threat of new entry—even just a *single* existing firm may have to act as if it faces vigorous competition.[22] As a result, such markets often have characteristics (e.g., price, quality, and level of innovation) similar or even identical to those with multiple existing competitors.

At the same time, of course, the economics of building, maintaining, and realizing a return on expensive infrastructures—along with the need to invest in and adapt to innovation—can limit the extent of new entry in broadband markets, potentially protecting incumbent providers from the full force of potential competition. The realities of dynamic competition[23]—that is, *sequential* (as opposed to contemporaneous) competition driven by changes in technology or consumer preferences—nonetheless ensure that such markets are regularly disrupted by innovative products and services, a process that does not always favor incumbents:

> With dynamic competition, new entrants and incumbents alike engage in new product and process development and other adjustments to change. Frequent new product introductions followed by rapid price declines are commonplace. Innovations stem from investment in R&D or from the improvement and combination of older technologies. Firms continuously introduce product innovations, and from time to time, dominant designs emerge. With innovation, the number of new entrants explodes, but once dominant designs emerge, implosions are likely, and markets become more concentrated. With dynamic competition, innovation and competition are tightly linked.[24]

Certainly, in some cases, a market with a small number of competitors can be uncompetitive, but it is a mistake to infer a causal connection. Indeed, "a history of absence of entry in an industry and a high concentration index may be signs of virtue, not of vice."[25] But nor does "a history of absence

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[22] *See* William J. Baumol, *Contestable Markets: An Uprising in the Theory of Industry Structure*, 72 AM. ECON. REV. 1, 14 (1982) ("In the limit, when entry and exit are completely free, efficient incumbent monopolists and oligopolists may in fact be able to prevent entry. But they can do so only by behaving virtuously, that is, by offering to consumers the benefits which competition would otherwise bring."). *See generally*, WILLIAM J. BAUMOL, JOHN C. PANZAR & ROBERT D. WILLIG, CONTESTABLE MARKETS AND THE THEORY OF INDUSTRY STRUCTURE (1982).

[23] *See* J. Gregory Sidak & David J. Teece, *Dynamic Competition in Antitrust Law*, 5 J. COMPETITION L. & ECON. 581, 602 (2009) [hereinafter "Sidak & Teece, *Dynamic Competition*"] ("Dynamic competition is powered by the creation and commercialization of new products, new processes, and new business models. As Schumpeter said, competition fueled by the introduction of new products and processes is the more powerful form of competition: 'competition from the new commodity, the new technology, the new source of supply, the new type of organization—competition which commands a decisive cost or quality advantage and which strikes not at the margins of the profits and the output of existing firms, but at their foundations and their very lives.'").

[24] *Id.*, at 604.

[25] Baumol, *Contestable Markets*, *supra* note 22, at 14.

of entry" accurately describe broadband markets: evidence demonstrates that the total number of broadband providers has, in fact, continued to increase, and broadband markets are plainly susceptible to new entry and the increasing competition it may bring.[26] Indeed, the history of telecommunications networks is one of ever-increasing competition from unexpected sources, as technological change has brought intermodal competition to previously distinct types of network facilities.[27]

Some critical analyses compound the error of assuming limited competition from a small number of competitors by employing inappropriately narrow market definitions (such that broadband markets appear to have fewer competitors), and by simultaneously disregarding the larger sources of potential competition that such narrow market definitions necessarily entail. Concentration metrics depend on artificial—and often inaccurate—market definitions. In broadband markets, for example, intermodal competition between wireless and wired providers is difficult to capture using concentration metrics based on Standard Industrial Classification (SIC) codes.[28] But with ongoing technological advances, wireless providers increasingly can offer extremely competitive broadband service, especially in areas with relatively limited fixed-wireline broadband deployment.[29]

But even within the wired broadband market itself, critical analyses frequently use improperly narrow market definitions. Notably, the Broadband for America's Future Report—which we find to be representative of many important errors contained in such criticisms of the broadband market, and which we thus discuss here at length—errs by dividing the market into discrete chunks based on speed tiers and assuming no provider in one tier exerts a competitive constraint on providers in other tiers. Drawing such concrete lines around fundamentally substitutable products, which are only partially differentiated, yields questionable conclusions. The handful of academic papers the

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[26] *See, e.g.,* 2020 Communications Marketplace Report, *supra* note 14, at ¶ 83 (providers for both rural and urban consumers have increased between 2018 and 2020). The FCC notes, for example, that "[m]ost broadband service providers serve less than 1% of the U.S. population; and only ten providers serve more than 5%." *Id.* at 56, n. 270. According to the FCC, since 2014, the total number of fixed residential providers in the United States has grown by 30% in urban areas and 25% in rural areas. *Id.* at ¶ 92.

[27] *See, e.g.*, Thomas W. Hazlett & Dennis L. Weisman, *Market Power in US Broadband Services*, 38 REV. INDUS. ORG. 151, 162 (2011) ("[T]he convergence of telecommunications networks has brought cable operators into direct rivalry with phone carriers. . . . Whereas cable systems traditionally provided only video and telephone companies supplied only voice services, both networks now provide "triple plays"—voice, broadband data, and video. By 2009, cable operators served nearly as many voice and broadband subscribers . . . as cable TV subscribers . . . .").

[28] Wireless and wired telecommunications are contained in separate SIC codes (SIC 6120 and 6110, respectively), and each of these encompasses a broader array of services than just broadband and a different array of services than each other.

[29] The FCC has noted that intermodal competition has been increasingly able to deliver substitutable services. *See* 2020 Communications Marketplace Report, *supra* note 14, at ¶ 131 ("Technological innovation and increased deployment in both the mobile wireless and fixed broadband services markets have broadened consumers' choices of how to access the Internet. In the mobile wireless market, for example, the availability of average and median nationwide download speeds in excess of 25 Mbps by the end of 2019 have meant that in parts of the United States, consumers could rely on a mobile connection for a variety of data-intensive applications, including high quality video, that previously required fixed broadband connectivity."). Further, mobile-only households have been slowly, but steadily, increasing between 2016 and 2019, from 13.2% to 14.1%. *See id.* at ¶¶ 132-33.

report draws on to find support for its approach likewise do not clearly indicate either that it is appropriate to isolate speed tiers for competition analysis, or that "more competitors" will generally yield better results.

One of the studies upon which it relies, published by Dan Mahoney and Greg Rafert in 2016, pursues a conception of local market competition that, at first glance, appears similar to the "market structuralist"[30] view advanced by the Broadband for America's Future Report. But the study's findings differ subtly from the broader claims that report advances and do not yield support for a structuralist view of broadband markets.[31] Mahoney & Rafert's top-level findings are that, when gigabit service is introduced to a market, the likelihood of price decreases for lower-speed plans goes up, as does the likelihood that other providers will increase speeds.[32] At first blush, this would appear to support a structuralist argument. But the analysis differs in a crucial respect: Mahoney & Rafert focus on *service* entry, not *provider* entry. As a result, Mahoney & Rafert's analysis is about the number of competitors within a particular *speed tier*, not about the number of competitors in the *market*.[33]

An example can illustrate the difference. Imagine a market with three competitors, only one of which offers gigabit service. If a second competitor—already in the market—deploys gigabit service in that market, that counts as "entry" under Mahoney & Rafert's analysis: the "gigabit broadband market" went from one gigabit provider to two gigabit providers.[34] But the number of providers in the *overall* market didn't change at all. Assuming there are no regulatory barriers to the introduction of new tiers of service by other competitors, such "entry" is virtually guaranteed if the first offer of gigabit service is successful. As contestability theory predicts,[35] the imminent threat of entry acts as a competitive constraint, just as the existence of another competitor already offering such service would.

It's a mistake to see these two types of entry as a disjunction: both are relevant, even if not perfectly equivalent. The Broadband for America's Future Report, in contrast, takes an unrealistically

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[30] *See generally*, JOE S. BAIN, INDUSTRIAL ORGANIZATION (1959) (developing the market structuralist "structure-conduct-performance" (SCP) paradigm); INDUSTRIAL CONCENTRATION: THE NEW LEARNING (Harvey J. Goldschmid et al. eds., 1974) (showing theoretical and empirical flaws of the SCP paradigm). In particular, *see* Harold Demsetz, *Two Systems of Belief About Monopoly*, in *id.* at 164-84. *See also* Timothy J. Muris, *Economics and Antitrust*, 5 GEO. MASON L. REV. 303, 303-06 (1997) (describing the role of the Airlie House Conference in focusing attention on Demsetz and other researchers whose empirical work undermined the assumptions of the SCP model).

[31] *See* Dan Mahoney & Greg Rafert, *Broadband Competition Helps to Drive Lower Prices and Faster Download Speeds for U.S. Residential Consumers*, Analysis Group White Paper (Nov. 2016) at 21-22, 24, *available at* https://www.analysisgroup.com/globalassets/content/insights/publishing/broadband_competition_report_november_2016.pdf.

[32] *Id.* at 1.

[33] *Id.*

[34] *Id.* at 12 ("Since most new, higher-speed plans are introduced by an existing provider that had previously only offered lower-speed Internet in that marketplace, for our choice model, we consider the decision made by existing providers in a marketplace experiencing entry of new, higher-speed plans.").

[35] *See, supra,* note 22, and accompanying text.

constricted conception of broadband competition. It describes, for instance, how 83 percent of the population live in an area with "no service or are served by a monopoly or duopoly."[36] But the report defines "service" as 100 Mbps broadband; it excludes as *adequate* service a range of speed tiers that are commensurate with how people actually use broadband. If we limit a market solely to premium products, of course, the set of providers for those products will be smaller than a market with reasonably available substitutes, such as slower broadband speeds (at lower prices) that still allow consumers to achieve what they wish online. As Jonathan Nuechterlein and Howard Shelanski note:

> Advocates claiming that cable broadband is a monopoly tend to obscure the extent of competition by gerrymandering the definition of "broadband" to exclude any service that does not meet some arbitrarily defined speed benchmark (*e.g.*, 100 Mbps or 1 Gbps). But such abstract definitions are economically meaningless if divorced from the facts of what consumers actually want and need. It makes no more sense to pick an aggressive speed threshold as the *sine qua non* of "broadband" than it does to define a "car" by the ability to hit 60 miles per hour in under six seconds.[37]

As noted above, it is similarly a mistake to assume away *simultaneous* competition across speed tiers. In other words, it is not only the prospect of future entry by providers of slower service into faster tiers that imposes competitive constraints; it is also consumers' willingness and ability to substitute service across speed tiers.

From a consumer perspective, "adequate" broadband speed is a complicated thing to measure. If a user streams HD video but does not engage very much in gaming or two-way video calling, a 10 Mbps service tier might be adequate.[38] Of course, many users today *are* doing two-way video calls, and many users find responsive gaming experiences important. In the latter case, a relatively higher speed tier may be necessary—even possibly up to the Broadband for America's Future Report's preferred 100 Mbps service tier. But other factors that affect the user's broadband experience have little to do with raw speed, such as jitter and latency. One of the most common bottlenecks for Internet speed is the

[36] Broadband for America's Future Report, *supra* note 7, at 46.

[37] Jonathan E. Nuechterlein & Howard Shelanski, *Building on What Works: An Analysis of U.S. Broadband Policy*, 73 FED. COMMC'NS L.J. 219, 229 (2021).

[38] *See* Bret Swanson, *Faster! No Wait, Slower! An Update on Broadband Speeds*, AEI (Aug. 30, 2019), https://www.aei.org/technology-and-innovation/telecommunications/faster-no-wait-slower-an-update-on-broadband-speeds.

home wireless router.[39] Upgrading a speed tier wouldn't do much to improve the user's experience where quality is dependent on network elements, hardware, or services outside of the ISP's control.[40]

In fact, Schmitt et al. demonstrate that video performance across a wide range of speed tiers (from 18 Mbps to 100 Mbps) tends to be roughly equivalent from a user's perspective, with the service provider (e.g., Netflix or Amazon) playing an important role in shaping their outgoing traffic in order to optimize delivery.[41] The performance of an Internet connection is dependent on a dynamic process that includes not just raw throughput from the ISP, but also the technological decisions of edge service providers to shape their traffic in real time as they detect changes in the network at-large. Given that the average consumer broadband speed across the United States varies between 58.6 Mbps and 174.3 Mbps,[42] and given that the ultimate level of received broadband performance is substantially affected by both the ISP (in the provisioning of its network) and the edge providers that design their services to optimally function over existing networks, it is difficult to maintain that either consumers or ISPs view different tiers of service as distinctly as critics do.

Indeed,

> [j]ust as wireless broadband can impose competitive pressure on the price of lower-speed wireline broadband, so, too can the prices of one speed affect the prices of another speed. . . . [C]onsumers will choose a price-speed combination that best matches their preferences. If a sufficiently large group of consumers are relatively indifferent between two

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[39] *See* Srikanth Sundaresan, Nick Feamster, & Renata Teixeira, *Home Network or Access Link? Locating Last-Mile Downstream Throughput Bottlenecks*, PAM 2016—PASSIVE AND ACTIVE MEASUREMENT CONFERENCE (Mar. 2016) at 10, *available at* https://hal.inria.fr/hal-01294924/document ("[I]n cases where wireless bottlenecks exist, at least one device in the home experiences a wireless throughput bottleneck during the tests. For about 75% of tests when HoA detects a wireless bottleneck, we only observe traffic for one device in the home. For the remaining 25% of tests with a wireless bottleneck, we investigate whether the active devices experience a downstream throughput bottleneck in the wireless network simultaneously. Simultaneous throughput bottlenecks in the wireless network to independent devices might indicate a more systemic problem (*e.g.*, pervasive interference, poor signal from the access point, contention), whereas isolated throughput bottlenecks are more likely to indicate a problem with a particular device. About half of the cases we observed involve throughput bottlenecks that are isolated to a single device; in another 45% of cases, all of the devices in the home simultaneously experience a throughput bottleneck.").

[40] *See, e.g.*, Paul Schmitt, Francesco Bronzino, Sara Ayoubi, Guilherme Martins, Renata Teixeira & Nick Feamster, *Inferring Streaming Video Quality from Encrypted Traffic: Practical Models and Deployment Experience*, PROCEEDINGS OF THE ACM ON MEASUREMENT AND ANALYSIS OF COMPUTING SYSTEMS (Dec. 2019), Art. 56, *available at* https://arxiv.org/pdf/1901.05800.pdf.

[41] *See id.* at 12 (This research demonstrates a minor deviation on the order of seconds between start-up time across services and speed tiers, showing that users with the relatively slowest broadband speeds do not appear to have a notably different Internet experience compared to users with higher speeds.) *See also* Comments of the International Center for Law & Economics and TechFreedom, *In the Matter of Protecting and Promoting the Open Internet*, GN Docket No. 14-28 (Jul. 17, 2014) at 35-37, *available at* https://laweconcenter.org/images/articles/icle-tf_nn_policy_comments.pdf.

[42] Tyler Cooper & Julia Tanberk, *Best and Worst States for Internet Coverage, Prices and Speeds, 2020*, BROADBANDNOW RESEARCH (Mar. 3, 2020), https://broadbandnow.com/research/best-states-with-internet-coverage-and-speed.

> speeds, then providers will pay attention to the price gap so that the price of a lower speed can help bring down the price of a higher speed.[43]

Ultimately, ISPs that exercise price discrimination with differing broadband tiers allow diverse users to satisfy their mix of preferences for price and performance from the ISP's menu of offerings. For a price-conscious consumer who doesn't do much gaming, a 10 Mbps tier is indeed a competitive option against a 100 Mbps offering; the choice range for an avid gamer might be narrower. This mix of consumer preferences suggests it is a mistake to isolate competition based on speed tiers, such as the claim that ISP A with a 100 Mbps offering does not compete with ISP B that offers service "only" up to 50 Mbps. Indeed, the group of users that *require* the fastest speeds is, by definition, in the tail of broadband demand. Evaluating broadband competition on the basis of a market's ability to provide service to meet the idiosyncratic demands of this small group will produce inaccurate assessments of the adequacy and extent of competition.

Even where correlations between market concentration and competitive effects are observed, the relationship is not linear. Gabor Molnar and Scott Savage[44]—whose 2017 study is another upon which the Broadband for America's Future Report relies—point to a more complicated picture in which "[t]he flattening out of the competition-quality effect above four ISP's . . . indicates that a large part of the interesting competitive conduct in the industry occurs in markets with one to four ISP's [sic]."[45]

Molnar & Savage focus on broadband quality (proxied by several speed measures) and contrast literal monopoly markets with markets containing between two and four competitors.[46] Although not explicitly stated, their analysis seems to suggest that the competitive conditions that drive welfare-enhancing effects are most likely observed with three competitors.[47] But Molnar & Savage also show that the most *significant* incremental benefit comes from adding a second service provider (relative to monopoly).[48] And while there is some marginal benefit from adding a third (and even some—although much less—benefit from adding a fourth) provider, by far the most substantial quality improvement is observed in moving from monopoly to duopoly.

Scott Wallsten and Colleen Mallahan similarly consider the effect of competition on broadband quality (as measured by speed), and reach similar conclusions, finding that that "DSL, cable, and

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[43] Scott Wallsten & Colleen Mallahan, *Residential Broadband Competition in the United States*, TPI Research Paper (Mar. 2010) at 6, http://ssrn.com/paper=1684236.

[44] Broadband for America's Future Report, *supra* note 7, at 49-50; Gabor Molnar & Scott J. Savage, *Market Structure and Broadband Internet Quality*, 65 J. INDUSTRIAL ECON. 73, 101 (2017).

[45] *Id.* at 100.

[46] *Id.*

[47] *See, e.g., id.*, at 99 ("Interestingly, once the market has about three or four incumbents, the marginal effect on quality from additional competitors is relatively small or zero.").

[48] *Id.* at 97 (Table VII).

fiber speeds are each significantly higher where there is more than one provider than when there is only a single provider."[49] They also find that adding a *third* provider has ambiguous effects: "Available cable speeds are higher with three wireline providers than with two wireline providers, though DSL and fiber speeds are not statistically different with three wireline providers from their speeds with two wireline providers."[50]

Yongmin Chen and Scott Savage examine how competition from a DSL provider affects a monopoly cable provider's *prices*.[51] They find that "the presence of a DSL provider in competition with a cable modem provider may or may not lower the cable provider's price, depending crucially on consumer preference diversity."[52] They also find that, on average, "quality-adjusted prices are not lower in duopoly markets."[53]

Indeed, as Nuechterlein & Shelanski note, duopoly broadband markets can generate sufficient competition:

> [T]he unusual cost structure of the broadband industry makes it more competitive than most other industries with similar levels of concentration. . . . [T]hat cost structure typically results in significant price competition even in duopoly broadband markets. The reason is intuitive. Suppose that two broadband ISPs have deployed similar networks in the same residential neighborhood, each sufficient to serve the full demand within that neighborhood. When one broadband provider loses a household to the other, it loses all revenues associated with that household but saves very little in the form of avoided costs. That economic reality gives each provider unusually strong incentives to offer substantial discounts in order to win and retain as many households as possible within the neighborhood, resulting in reasonably competitive equilibrium prices.[54]

Nuechterlein & Shelanski do not assert that duopoly is necessarily ideal for broadband markets, but they do contend—consistent with the empirical analyses described above—that movement from monopoly to duopoly provides the most significant improvement in competitive outcomes. Because of the unique features of broadband deployment, a broadband duopoly market may be substantially more competitive than other two-provider markets.[55] Thus, "the equilibrium in small numbers competition can be efficient, reflecting economies that deliver social benefits. Indeed, the lack of

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[49] Wallsten & Mallahan, *supra* note 43, at 2.

[50] *Id.* at 26.

[51] Yongmin Chen & Scott Savage, *The Effects of Competition on the Price for Cable Modem Internet Access*, 93 REV. ECON. & STAT. 201 (2007).

[52] *Id.* at 217.

[53] *Id.* at 204.

[54] Nuechterlein & Shelanski, *supra* note 37, at 230-31.

[55] *Id.*

atomistic competition in the broadband marketplace . . . is a feature, not a bug."[56] Moreover, broadband markets are more susceptible to technological disruption than many other markets. As competitive technologies like fixed wireless, 5G, WiFi 6, and next-generation satellite become more commercially available, the incumbent providers of cable, DSL, and fiber can be quickly displaced.[57]

All told, the common finding of the literature is that the ability to predict with any confidence that adding or removing a competitor will appreciably affect competitive effects greatly depends on the initial conditions in the market; there is no continuous correlation between more competitors and better outcomes.

C. The misunderstood relationship between concentration and competition

In recent years, an outpouring of academic and media commentary has centered on the contention that a great number of industries, particularly in the technology sector, are experiencing increased concentration and are therefore insufficiently competitive.[58] This belief has been an important driver of recent scholarly and legislative interest in altering legal standards to create, for example, presumptions against "large" firms, or to ban certain forms of vertical conduct.[59] Critics often cite lax antitrust enforcement as a proximate cause of this purportedly rising concentration[60] and, in turn, advocate government regulation and/or antitrust enforcement to reduce concentration, on the premise that less concentrated markets are more competitive.

But economic theory and evidence undercut the emerging narrative that U.S. antitrust authorities and regulators have failed to protect competition by allowing increased concentration over the last

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[56] Hazlett & Weisman, *supra* note 27, at 169.

[57] *See, e.g.,* Mark Israel, Michael Katz, & Bryan Keating, *International Broadband Price Comparisons Tell Us Little About Competition and Do Not Justify Broadband Regulation* (May 2021) at 3, *available at* https://www.ncta.com/sites/default/files/2021-05/international-price-comparisons-paper-11-may-2021.pdf ("[T]he increased deployment of fiber by competing wireline broadband competitors and the emergence of 5G wireless broadband services as well as LEO broadband satellite services in the United States mean that broadband competition in the near future will be greater than competition today or in the recent past.").

[58] *See, e.g.*, Jan De Loecker, Jan Eeckhout & Gabriel Unger, *The Rise of Market Power and the Macroeconomic Implications*, 135 Q. J. ECON 561 (2020); Simcha Barkai, *Declining Labor and Capital Shares,* 75 J. FINANCE 2421 (2020); Giulio Federico, Fiona Scott Morton & Carl Shapiro, *Antitrust and Innovation: Welcoming and Protecting Disruption*, 20 INNOVATION POL'Y & ECON. 125 (2020); Fiona Scott Morton, *Modern U.S. Antitrust Theory and Evidence Amid Rising Concerns of Market Power and its Effects*, WASH. CTR. FOR EQUITABLE GROWTH (May 29, 2019), https://equitablegrowth.org/research-paper/modern-u-s-antitrust-theory-and-evidence-amid-rising-concerns-of-market-power-and-its-effects/?longform=true.

[59] *See, e.g.*, H. Comm. on the Judiciary, Subcomm. on Antitrust, Commercial, and Administrative Law, 116th Cong., Investigation of Competition in Digital Markets: Majority Staff Rep. and Recommendations (2020), *available at* https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf; Competition and Antitrust Law Enforcement Reform Act, S. 225, 117th Cong. (2021).

[60] *See, e.g.*, Fiona Scott Morton, *Reforming U.S. Antitrust Enforcement and Competition Policy*, WASH. CTR. FOR EQUITABLE GROWTH (Feb. 18, 2020), https://equitablegrowth.org/reforming-u-s-antitrust-enforcement-and-competition-policy/.

40 years. Economists have long known that there is no necessary correlation between concentration and competitive harms.[61] Concentration can be driven by efficiency gains from scale or by technological change, and can coincide with social welfare improvements in the form of lower prices or greater investment. In some markets, the optimal number of firms may, in fact, be just one, as in the case of natural monopolies.[62]

Indeed, in some industries where there does appear to be increasing concentration in recent years, it has been correlated with increased productivity. Such concentration appears to be driven by technology, not by anticompetitive conduct. Thus, the apparent concentration is fundamentally an artifact of increased efficiency; in dynamic industries, as concentration increases, *consumer welfare also tends to increase.* As we discuss below, both the assessment that markets are too concentrated, as well as the policy prescriptions that flow from this belief, are deeply flawed.

1. The wishful thinking of the structuralist economists

A popular narrative among antitrust observers is that increased concentration in the United States has dampened competition. Some influential economists, like Germán Gutiérrez and Thomas Philippon, have argued that the EU, with its more aggressive competition enforcers, have done a better job reducing concentration and improving competitive outcomes.[63] In particular, they argue (1) that the United States has trended toward greater concentration while the EU has trended toward less concentration due to enforcement policies, (2) that this has led to increased profits for U.S. companies vis-à-vis EU counterparts, and (3) that this has led to higher prices for U.S. consumers compared to EU consumers.[64] But a more nuanced look at the evidence suggests that almost everything about the narrative derived from scholars like Gutierréz and Phillipon is overstated or wrong.

First, as of 2012, market concentration trends in the United States and the EU were more or less the same.[65] While the telecommunications industry is a notable outlier, in all of the other markets they chose to analyze, eight-firm concentration ratios were below 40 percent for both the U.S. and EU. In fact, in seven of the 12 sectors surveyed, the U.S. had lower eight-firm concentration ratios than the EU. Thus, the evidence in their own paper doesn't support their broad conclusion.

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[61] *See* Harold Demsetz, *Industry Structure, Market Rivalry, and Public Policy*, 16 J. L. & ECON. 1 (1973); and *see* Harold Demsetz, *The Intensity and Dimensionality of Competition*, in HAROLD DEMSETZ, THE ECONOMICS OF THE BUSINESS FIRM: SEVEN CRITICAL COMMENTARIES 137, 140-41 (1995).

[62] In such markets, it is competition "for the market" that continues to drive innovation and consumer welfare increases. *See* Harold Demsetz, *Why Regulate Utilities?*, 11 J. L. & ECON. 55, 55 (1968).

[63] *See* Germán Gutiérrez &Thomas Philippon, *How European Markets Became Free: A Study of Institutional Drift*, NBER Working Paper 24700 (June 2018), *available at* https://www.nber.org/system/files/working_papers/w24700/w24700.pdf.

[64] *See id.* at 2-6.

[65] *See* Eric Fruits, *EU Markets are More Competitive than U.S. Markets? Not So Fast*, TRUTH ON THE MARKET (Nov. 19, 2018), https://truthonthemarket.com/2018/11/19/eu-markets-are-more-competitive-than-u-s-markets-not-so-fast/.

Second, there's similarly little difference between the U.S. and EU averages when it comes to profits; they both hover around a net operating surplus rate of a little more than 7 percent.[66] This includes a huge variation in net operating surplus rates across EU countries.[67] Even the slope of the trendlines for net operating surplus in the U.S. and EU are substantially similar; both are statistically barely above zero.[68]

Third and finally, there is precious little evidence that U.S. prices are rising faster than those of the EU in the selected markets. From 2013 to 2019, prices in telecommunications declined by 12 percent in the United States and only 5 percent in the EU.[69] In airlines, prices fell by 6 percent in the U.S. and increased in the EU by 30 percent.[70] If anything, the data in those select markets tell a very different story about the level of competitiveness, even in light of growing concentration in those two markets.

The basic story that the EU, with more aggressive antitrust enforcement, has produced better economic results than the U.S. is suspect. More nuanced academic considerations of the data on concentration, its causes, and its *effects* further erode the common narrative. In fact, as these papers show, the reason for increased concentration in the U.S. in recent years appears to be technological, not anticompetitive, and its effects appear to be beneficial, not harmful.

For instance, according to Chang-Tai Hsieh and Esteban Rossi-Hansberg, increased concentration among top firms at the national level "is entirely driven by entry of top firms into new markets."[71] And where there is increasing concentration, the researchers found, it arises due to efficiency improvements from new technologies:

> [A] key ingredient of the industrial revolution in services . . . are new fixed-cost-intensive technologies that lower the marginal cost of production in all markets served by the firm. . . . Firms that adopt the new fixed-cost-intensive technology in an industry expand by serving new markets that are now viable due to their lower marginal cost. Top firms, which are more productive, find the trade-off between fixed and variable costs more beneficial and so they adopt the new technology more intensively, which leads to a rise in industry concentration. It also leads to industry expansion relative to industries where these new technologies are less useful or more costly. . . .

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[66] *See* Eric Fruits, *Drifting Toward Nonsense on EU vs. US Competitiveness: The Profits Puzzle*, TRUTH ON THE MARKET (Dec. 4, 2018), https://truthonthemarket.com/2018/12/04/drifting-toward-nonsense-on-eu-vs-us-competitiveness-the-profits-puzzle/.

[67] *Id.*

[68] *Id.*

[69] *See* Eric Fruits, *Rising Concentration: Drifters Followup Is Worse Than the Original*, TRUTH ON THE MARKET (Sept. 18, 2020), https://truthonthemarket.com/2020/09/18/rising-concentration-drifters-followup-is-worse-than-the-original/.

[70] *Id.*

[71] Chang-Tai Hsieh & Esteban Rossi-Hansberg, *The Industrial Revolution in Services*, Working Paper (May 12, 2021) at 36, *available at* https://www.princeton.edu/~erossi/IRS.pdf.

> . . . The increasing presence of top firms has decreased local concentration in local markets as the new establishments of top firms gain market share from local incumbents. We see the share of the top firm and the local Herfindahl-Hirschman index decline everywhere, but the decline is much more pronounced in small cities. Contrary to popular narratives, the entry of these top firms has been accompanied by significantly faster employment growth in small cities. As a result, we see that job destruction due to exit or incumbents' employment decline does not vary much by city size. The larger increase in the share of top firms in most cities, but most markedly in small ones, implies that consumers opted to buy from them and so probably gained from their presence. The gain from entry by top national firms into local markets is not measured in official price statistics because current statistical procedures only measures prices from incumbent establishments. Following the methodology in Aghion et al., we calculate "missing growth" to be 1.2% per year in the smallest cities, as low as 0.2% in the largest ones, and 0.5% in the aggregate.[72]

These findings are further supported by the superstar firm theory,[73] which suggests that, both in the United States and abroad, increased competition is due to increased efficiency.[74] David Autor et al., for example, find that rising market concentration is a result of increased productivity that weeds out less efficient producers.[75] Social welfare improves as less efficient producers are replaced. As Hsieh & Rossi-Hansberg note, "[t]his evidence is consistent with our view that the rise of markets per firm is driven by forces such as the adoption of new technologies or management practices that ultimately raise aggregate industry total factor productivity (TFP)."[76]

Indeed, the findings of these papers also make intuitive sense. If technology is a major driver of concentration, it is because technology enables firms to be more productive (to do more with less). Technological improvements also mean that firms can sustain larger economies of scale and reach

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[72] *Id.* at 5-6. *See also* Esteban Rossi-Hansberg, Pierre-Daniel Sarte & Nicholas Trachter, *Diverging Trends in National and Local Concentration*, 35 NBER MACROECON. ANNUAL 2020 (Martin Eichenbaum, Erik Hurst, & Jonathan A. Parker, eds 2020) (April 20, 2020 draft at 27, *available at* https://www.nber.org/chapters/c14475) ("[T]he increase in market concentration observed at the national level over the last 25 years is being shaped by enterprises expanding into new local markets. This expansion into local markets is accompanied by a fall in local concentration as firms open establishments in new locations. These observations are suggestive of more, rather than less, competitive markets.").

[73] David Autor, David Dorn, Lawrence F. Katz, Christina Patterson, & John Van Reenan, *The Fall of Labor Share and the Rise of Superstar Firms*, 135 Q. J. ECON. 645 (2020).

[74] *Id.* at 650 ("Our formal model, detailed below, generates superstar effects from increases in the toughness of product market competition that raise the market share of the most productive firms in each sector at the expense of less productive competitors. . . . **An alternative perspective on the rise of superstar firms is that they reflect a diminution of competition, due to a weakening of U.S. antitrust enforcement** (Dottling, Gutierrez, & Philippon, 2018). **Our findings on the similarity of trends in the U.S. and Europe, where antitrust authorities have acted more aggressively on large firms (Gutierrez and Philippon, 2018), combined with the fact that the concentrating sectors appear to be growing more productive and innovative, suggests that this is unlikely to be the *primary explanation***, although it may important in some specific industries (see Cooper et al., 2019, on healthcare for example).") (emphasis added).

[75] *Id.* at 648.

[76] Chang-Tai Hsieh & Esteban Rossi-Hansberg, *supra* note 71, at 4.

more consumers in more places, which would both drive national concentration up while also facilitating more competitors in local markets.[77]

A simple example helps illustrate this point: if a drug-store chain based on the East Coast acquires a drug store chain on the West Coast, national concentration goes up, but local concentration remains constant. In fact, owing to increased scale, the new acquisition may allow the combined drug store chain to realize efficiencies internally (through, for instance, adopting superior management from both firms and shedding inefficient practices) and externally (with greater purchasing power that it can use to obtain discounts from suppliers and pass them on to consumers).

The lack of correlation between increased concentration and either anticompetitive causes or deleterious economic effects is demonstrated by an influential recent empirical paper by Sharat Ganapati. Ganapati finds the increase in industry concentration in U.S. non-manufacturing sectors between 1972 and 2012 was "related to an offsetting and positive force—these oligopolies are likely due to technical innovation or scale economies. [The] data suggests that increases in market concentration are strongly correlated with innovations in productivity."[78] The result is that increased concentration results from a beneficial growth in firm size in productive industries that "expand real output and hold down prices, raising consumer welfare, while maintaining or reducing their workforces, lowering labor's share of output."[79]

Ganapati notes that it may be the case that technology has become increasingly important in amplifying the effect of fixed costs on reducing marginal costs: "Investments, that once provided limited scope for either increasing demand or decreasing marginal costs, are aided by technical change and now may create winner-take-all economies."[80] In other words, where high fixed-cost investments once were difficult to fully exploit, larger markets tended to see relatively more entrants.[81] However, as the ability to extract value from large upfront investments increases, a firm's ability to operate efficiently at larger scale increases, leading to more concentrated, but also more productive and efficient, markets.

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[77] *Id.* at 21 ("[M]ore than 100% of concentration growth has to come from the increase in the number of establishments served by the top firms. . . . [M]ost of the growth in concentration also comes from growth in the number of cities served by top firms. Only about 6% of the growth in concentration comes from increased employment per city, and about 21% comes from increased sales per city.").

[78] Sharat Ganapati, *Growing Oligopolies, Prices, Output, and Productivity*, Census Working Paper CES-WP-18-48 (Jan. 20, 2020) (*forthcoming* in AM. ECON. J. MICROECON.), *available at* https://www.sganapati.com/files/Ganapati_2019_OligopoliesPricesQuantities_AEJmicro.pdf

[79] *Id.* at 1.

[80] *Id.* at 17.

[81] *Id.* ("[I]f fundamental parameters governing sunk costs remain constant, larger markets become more appealing to entrants. However, in a world with technology growth and/or changing production costs, this may not be true.").

Telecommunications companies fit this model well. At one point in time, high fixed costs and relatively small returns meant that firms could deploy broadband networks only at a relatively slow pace by today's standards. This left room for more and smaller competitors to operate, but to do so relatively inefficiently. As technology has augmented firms' ability to deploy and manage networks using fewer resources at the margin, productivity has risen, leading firms to be better able to quickly and efficiently deploy in larger areas. As more efficient "superstar" providers work through this process, less efficient providers exit (or do not enter). This leaves the market relatively more concentrated, but significantly more efficient. These firms' investments in more concentrated markets may be financed by slightly higher rates of return. The net effect could be slightly higher prices, but the ultimate result is more output at higher quality, as the efficiency gains outpace price increases. In keeping with Hsieh & Rossi-Hansberg's more general findings regarding national and local concentration, the number of broadband competitors has been consistently increasing at the local level, even as national concentration metrics appear to have declined. As Michelle Connolly and James Prieger find:

> [A]t least three in four entrants at the ZIP code level expand geographically into the area. When the local markets are delineated by service type, another one in every five entrants is a firm already operating in the area that diversifies its product mix by offering another type of broadband access. These entrants are also much larger than de novo entrants on average. Thus, most entry and much of the dynamism in the market, along with the new options that entry provides for consumers, comes from large, existing firms.[82]

Indeed, consistent with the idea that *national* level concentration can mask *local* level competition, Connolly & Prieger find that "[m]ost entry is from existing providers expanding into new geographic areas. Existing firms diversifying their service offerings is the next most common form of entry."[83]

A critical literature review by Eric Fruits et al. of studies that look at changes in market concentration metrics in wireless telecommunications markets similarly finds that increased concentration does not necessarily lead to harmful effects.[84] Like other broadband services, the provision of wireless telecommunications service is characterized by strong economies of scale, high fixed costs, and large

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[82] Michelle Connolly & James E. Prieger, *A Basic Analysis of Entry and Exit in the US Broadband Market, 2005-2008*, Pepperdine University School of Public Policy Working Paper No. 42 (2013) at 5, https://digitalcommons.pepperdine.edu/sppworkingpapers/42/ (*published as* Michelle Connolly & James E. Prieger, *A Basic Analysis of Entry and Exit in the US Broadband Market, 2005-2008*, 12 REV. NETWORK ECON. 229 (2013)).

[83] *Id.* at 29 ("71% of entry (75% by share) is from geographic expansion of established service providers, and 21% is from product diversification within the area. Entrants into a market average 64% of the size of the incumbents combined, and thus are relatively large. Thus, notwithstanding potential antitrust concerns about the dominance of large broadband providers, . . . it appears that a large share of new options provided to consumers has come from these firms.").

[84] *See* Eric Fruits, Justin (Gus) Hurwitz, Geoffrey A. Manne, Julian Morris, & Alec Stapp, *Static and Dynamic Effects of Mergers: A Review of the Empirical Evidence in the Wireless Telecommunications Industry*, OECD Directorate for Financial and Enterprise Affairs Competition Committee, Global Forum on Competition, DAF/COMP/GF(2019)13 (Dec. 6, 2019), *available at* https://one.oecd.org/document/DAF/COMP/GF(2019)13/en/pdf [hereinafter "Fruits et al."].

regulatory overlays. And although wireless is a relatively concentrated industry, carriers continue to make long-term investments in their networks—even, in some cases, those facilitated by mergers.[85] This behavior generates a positive feedback cycle where investment yields innovation, which in turn leads to further investment. Without participating in this cycle, providers would become quickly outmoded, and less desirable options for consumers.[86] Even when short-term static effects have led to price increases following mergers, competitive pressures tend to wash out these price increases through efficiency gains over the long term.[87] As Fruits et al. finds, productivity gains are frequently realized when dynamic, technology-driven markets become more concentrated.

Of the economic studies reviewed by Fruits et al. that looked at specific mergers, about half found that short-term prices decreased following a merger and half found that short-term prices increased. But *all* found likely beneficial non-price effects. And among the studies that included investment effects in their analyses, *all* found that capital investment increased post-merger.[88] As Fruits et al. conclude:

> Studies that do not consider these [non-price] effects are incomplete for purposes of evaluating the mergers' consumer welfare effects, and [are] all-too-easily used by advocates to misleadingly predict negative consumer outcomes. This is not necessarily a criticism of the studies themselves, which generally do not make comprehensive policy conclusions. The reality is that it is exceptionally difficult to comprehensively study even price effects, such that a well-conducted study of price effects alone is a valuable contribution to the literature. Nevertheless, in the context of evaluating prospective transactions, the results of such studies must be discounted to account for their exclusion of non-price effects.[89]

Ultimately, the study found no basis to conclude, ex ante, that a particular concentration of providers in a local market is optimal: the factors that influence competitiveness in local wireless markets are too varied to yield a generalizable optimal level of concentration. The analysis revealed instead

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[85] *See, e.g., Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations*, *Appendix G: Declaration of David S. Evans*, In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197 (Jun. 18, 2018), at 7 [hereinafter "Evans Declaration"], *available at* https://bit.ly/2YZ3VlC; Evans Declaration at 72, § IV. *See also* Geoffrey Manne, Julian Morris Kristian Stout, & Justin (Gus) Hurwitz, *Comments of the International Center for Law and Economics in Opposition to Petitions to Deny*, In the Matter of Applications of T-Mobile US, Inc. and Sprint Corporation for Consent to Transfer Control of Licenses and Authorizations, WT Docket No. 18-197 (Sep. 17, 2018), *available at* https://ecfsapi.fcc.gov/file/10918839300242/ICLE%20-%20Comments%20-%20TMobile-Sprint%20Merger.pdf.

[86] *See, e.g.,* Evans declaration, *supra* note 85, at ¶ 174.

[87] *See, e.g.*, Christos Genakos, Tommaso Valletti & Frank Verboven, *Evaluating Market Consolidation in Mobile Communications*, 33 ECON. POL'Y 45 (2018).

[88] *Id.* Fruits et al., *supra* note 84, at ¶¶ 4, 6, 22.

[89] *Id.* at ¶ 61.

that, even when one firm appears to "win" a wireless telecommunications market, competitors retain incentive to make long-term investments. As Fruits et al. note:

> Firms "race" to deploy new technologies both so that they can offer customers a higher-quality product (and correspondingly charge more for that product) and also so that, if they "win" that race compared to their peers, they will benefit from a period of reduced competition while other firms continue to upgrade their own networks. Mergers that occur during periods of technological dynamism may tend to increase the short-term, negative price effects of monopolistic competition, allowing firms to raise their prices further above marginal cost than in periods of static technologies, during which firms instead compete on price alone. But that effect may also increase the pace of deployment of a next-generation technology, during a period that the firm's competitors are also deploying their own next-generation technologies, thus benefitting consumers in the short-run (by allowing them access to more advanced technology sooner) and also in the long-run (as completion of these improved networks facilitates price competition).[90]

The larger lesson of these results is that it is difficult to derive general policy implications even from detailed studies. There is little empirical support for simplistic models of competition and markets, such as structural rules that create bright lines around some particular number of competitors. As suggested above,[91] in markets where capital costs are high, investment timelines are long, and technology constantly threatens to disrupt incumbents, counting competitors is a particularly misleading way to assess competition.

D. U.S. broadband prices are neither high, nor caused by limited competition

Finally, critics of the current state of U.S. broadband competition ultimately purport to demonstrate the significance of their claims by pointing to U.S. broadband prices, claiming that they are both higher than those elsewhere in the world and that this can be explained by a lack of competition. The Broadband for America's Future Report is emblematic: "The practical reason to support greater competitive entry is to remove the shadow of artificially high prices (or lower quality or less innovation or all of the above) from consumers."[92] Neither claim is accurate, however.

The Broadband for America's Future Report relies on OECD data to conclude that broadband prices in the United States compare unfavorably to those in other OECD countries, and it ties this claimed result directly to the extent of competition in U.S. broadband markets: "[W]ith limited competition, it is perhaps unsurprising that Americans pay some of the highest broadband prices in

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[90] *Id.* at ¶ 63.

[91] *See* Section I.B.

[92] Broadband for America's Future Report, *supra* note 7, at 49 (citing OECD, *OECD Fixed Broadband Basket, High User*, OECD BROADBAND PORTAL (June 2017), http://www.oecd.org/sti/broadband/broadband-statistics/).

the world. Among the 35 OECD countries studied, America was the second most expensive in 2017."[93]

In fact, however, when adjusted for cross-country differences—such as differences in purchasing power and individual income—the United States compares quite favorably to the rest of the OECD. The Economist Intelligence Unit, for example, ranks U.S. broadband 5th in affordability (behind four other OECD countries: Canada, the U.K., France, and Italy) after accounting for "the cost of access relative to income and the level of competition in the Internet marketplace."[94] Among only OECD countries, the International Telecommunication Union ranks U.S. fixed broadband prices tied for 3rd in affordability, measured as a share of gross national income (GNI) per capita (and tied for 12th among all 173 countries measured).[95]

While neither of these rankings is above reproach (and no truly definitive study exists), the rankings typically relied upon by critical analyses such as the Broadband for America's Future Report exhibit fatal defects that render them particularly unilluminating.[96] For example, the OECD study is based on extremely outdated data, an unweighted selection of plans (based on only a single service plan for each country), plans of widely divergent quality across countries,[97] and widely varying measures of purchasing power across currencies.[98] These lapses are particularly significant for drawing conclusions regarding U.S. broadband competitiveness, because country-level comparisons with a country as large and diverse as the United States mask complexities that are crucial to assessing competition at the local level on which it occurs.

Given wide geographic and socio-cultural differences within the United States, it is unhelpful to generalize about the needs of a single abstract "American consumer" of broadband. There are also large differences in infrastructure, consumer demand, and legal and regulatory environments across states and municipalities. Even within states, there can be large differences among the offerings (and their relative prices and qualities) available city-by-city, and between urban and rural regions. And

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[93] *Id.* at 46.

[94] *The Inclusive Internet Index*, THE ECONOMIST INTELLIGENCE UNIT (last visited May 12, 2021), https://theinclusiveinternet.eiu.com/explore/countries/US/performance/indicators/affordability. Notably, the same analysis ranks U.S. broadband as 10th in "competitive environment" (its measure of concentration) among OECD countries—hardly the worrisome outlier described by critics—and 2nd overall (accounting for both supply and demand-side factors contributing to "inclusiveness" (its measure of success in closing the digital divide)). *See also* Israel, Katz, & Keating, *supra* note 57.

[95] ITU, *Measuring Digital Development: ICT Price Trends*, ITU (2019) at 61, *available at* https://www.itu.int/en/ITUD/Statistics/Documents/publications/prices2019/ITU_ICTpriceTrends_2019.pdf.

[96] *See* Israel, Katz, & Keating, *supra* note 57 (analyzing the reliability of the data used by three of the most cited international rankings of broadband prices).

[97] *See id.* at 21 ("For example, the United States is represented by a Comcast plan offering 55/5 Mbps service, while Turkey is represented by 25/2 Mbps plan. This is not an isolated example.").

[98] *See id.* at 18-22.

the narrow focus on a single "representative" "high-use" plan diverts focus away from entry-level plans where it most matters,[99] and fails to capture the ways typical users actually consume broadband.[100]

Even a casual glance at the data reveals the complexity of U.S. broadband service and pricing. One estimate puts the national average at about $0.76/Mbps—a figure that conceals a great bit of variation.[101] Among states, the range of cable service pricing varies from $0.12/Mbps to $1.00/Mbps, with a fairly wide spread of prices between $0.40/Mbps and $1.00/Mbps.[102] The market for fiber broadband tells a similar story, with a range of between $0.04/Mbps and $2.00/Mbps, and prices varying widely between $0.20 and $1.00/Mbps.[103] The pervasive characteristic of U.S. broadband pricing is not its average level but the enormous variation in prices across geographic areas and services. These variations can be attributed to myriad factors other than the extent of market concentration.

Indeed, factors in no way attributable to industry structure have long been recognized as the primary source of this variation and thus the nation's overall broadband price level. For this reason, the claim that the United States lags international competitors based on unnuanced aggregate price comparisons remains strongly contested.[104] For example:

> [N]etwork costs per consumer and thus retail prices depend in large part on economies of density, and the countries subject to these comparisons have vastly different population densities—the U.S. averages eighty-seven people per square mile, whereas the U.K. averages 725 and South Korea averages 1,338. And some international comparisons, including the FCC's, have found that U.S. fixed-line broadband metrics are in fact

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[99] *See* Doug Brake & Alexandra Bruer, *Broadband Myths: Are High Broadband Prices Holding Back Adoption?,* ITIF (Feb. 8, 2021) at 5, https://itif.org/sites/default/files/2021-broadband-myths-affordability.pdf ("The steeper price discrimination of broadband offerings in the United States means digital elites looking for higher-speed services may indeed face higher prices compared to some European countries. But again, if we are concerned with whether broadband is affordable, it makes sense to focus on making sure entry-level plans are affordable to all Americans before worrying about the price of the highest performance tiers. For entry-level speeds, OECD data puts U.S. broadband prices below or within two dollars of Iceland, Ireland, Luxembourg, New Zealand Norway, Spain, and Switzerland—by no means outside the norm of peer countries.").

[100] *See supra* nn. 9-13, and accompanying text.

[101] *See The Shrinking Cost of a Megabit*, NCTA (Mar. 28, 2019), https://www.ncta.com/whats-new/the-shrinking-cost-of-a-megabit (*cited in* Nuechterlein & Shelanski, *supra* note 37, at 228).

[102] *See The Cost of My Internet by State in the USA*, BROADBANDSEARCH (last visited May 24, 2021), https://www.broadbandsearch.net/blog/internet-cost-by-state.

[103] *Id.*

[104] Nuechterlein & Shelanski, *supra* note 37, at 236.

> superior to those of most peer nations once appropriate adjustments are taken into account.[105]

The Broadband for America's Future Report identifies a correlation between households in states with relatively lower median income and relatively higher prices for 25/3 Mbps broadband service, ascribing the effect to "limited competition."[106] Of course, correlation is not causation; given the many factors that go into broadband pricing, it is unclear which way this observation cuts. For instance, median household income is lower in rural than in urban areas,[107] meaning that these lower-income households may also be disproportionately rural, which would increase the average cost of deployment per household.[108] It is certainly an appropriate object of policy concern that lower-income households may pay more for broadband, but it may well be a function of their geographic location, not the extent of competition. Policy prescriptions rooted in the assumption that a lack of competition is at the root of the problem are unlikely to be effective.

II. Toward an understanding of dynamic competition in broadband

As discussed above—and contra the critical analyses that rest upon the contrary assumption—it is not clear that increased concentration implies decreased competition. Indeed, in many markets increased concentration may be an indicator of *greater* competition.[109] In many cases, this is driven by potential competition as much as, or more than, existing in-market competitors:

> In dynamic contexts, potential competitors can have much greater importance. What today appears merely to be a potential competitor can obliterate incumbents tomorrow in acts of Schumpeterian creative destruction. To exclude such a competitor from the boundaries of the market would clearly be a mistake.[110]

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[105] *Id.* at 236-37. Note that the authors here are analyzing claims that the U.S. should adopt a wholesale broadband model similar to the U.K.'s approach. The basic logic supporting their rebuttal is more generally applicable. The geographic and population-level differences across the U.S. make it impossible to offer one-size-fits-all policy prescriptions based on comparisons with far more homogeneous countries.

[106] Broadband for America's Future Report, *supra* note 7, at 47.

[107] *See* U.S. Census Bureau, *A Comparison of Rural and Urban America: Household Income and Poverty* (Dec. 8, 2016), https://www.census.gov/newsroom/blogs/random-samplings/2016/12/a_comparison_of_rura.html ("According to the 2015 American Community Survey, median household income for rural households was $52,386, about 4.0 percent lower than the median for urban households. . . .").

[108] Along these lines, the FCC observes that "[i]n general, these data suggest that the average household adoption rate in a county increases with median household income and population density, and decreases with increases in the poverty rate and rural population rate." 2020 Communications Marketplace Report, *supra* note 14, at ¶ 144. Thus, as the costs of deployment shift because of low population density, or a relatively lower willingness to pay, the demand curve shifts, and prices increase.

[109] *See supra* Section I.B; *see also* Sidak & Teece, *Dynamic Competition*, *supra* note 23, at 604.

[110] *See* Sidak & Teece, *Dynamic Competition*, *id.* at 614.

Where traditional antitrust law tends to employ narrow, static indicia such as price levels and market shares to gauge competitiveness, a focus on "dynamic competition" may be more appropriate in technology-driven markets. Dynamic markets are not typically composed of many competitors making marginal price adjustments to capture small slices of market share. Instead, such markets often experience *sequential* competition: firms vie to capture the *entire* market (or most of it), with would-be competitors and new entrants attempting to disrupt incumbents by introducing innovative new products or business models to supplant previous technologies.

The assumption that more concentration must mean less competition stems from a blackboard model of "perfect competition," where innovation is merely a competitive dimension that emerges from a healthy market structure, rather than innovation driving the evolution of market structures. Rivalry is, of course, important, but no one seriously believes we live in a world of perfect competition characterized by atomistic firms competing to produce commodity goods and services. Yet this simplistic structuralist view of markets is frequently advanced in policy discussions.[111]

As Harold Demsetz famously observed, "the asserted relationship between market concentration and competition cannot be derived from existing theoretical considerations and that it is based largely on an incorrect understanding of the concept of competition or rivalry."[112] In the case of natural monopolies, scale economies may make it more efficient for one firm to produce a good or service in a given market than it would be for two or more firms. Scale economies arise when high fixed costs are spread over a larger number of goods, allowing larger firms to enjoy lower per-unit costs of production. Due to economies of scale, markets like broadband, with high fixed costs, will tend to have fewer firms than markets with lower fixed costs. But Demsetz demonstrated that, even then, competition *for the market itself* can lead to an efficient result that prevents the typical welfare harms attributed to monopolies.[113]

The oft-neglected literature on dynamic capabilities and organizational strategy, by contrast, supports the supposition that innovation drives market structure.[114] For the last several decades, this literature has demonstrated that static price-effect-focused analysis is insufficient to understand dynamic markets. For dynamic markets, instead, it is *performance* that matters, with price as a secondary consideration and innovation as an important component of performance.[115] So long as a market remains

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[111] *C.f.* Sidak & Teece, *Dynamic Competition*, *id.* at 585 ("Indeed, it is common to find a debate about innovation policy among economists collapsing into a rather narrow discussion of the relative virtues of competition and monopoly, as if they were the main determinants of innovation. Clearly, much more is at work.").

[112] Demsetz, *Why Regulate Utilities?*, *supra* note 62, at 55.

[113] *See* Sidak & Teece, *Dynamic Competition*, *supra* note 23.

[114] *See id.*

[115] See, *e.g.*, Thomas M. Jorde & David J. Teece, *Competing Through Innovation: Implications for Market Definition*, 64 CHI.-KENT L. REV. 741, 742 (1988) ("Moreover, in markets characterized by rapid technological progress, competition often takes place on the basis of performance features and not price."); *See also* David S. Evans & Richard Schmalensee, *Some Economic Aspects*

contestable, even if it's highly concentrated, the performance of firms will determine the likelihood of new entrants. It is pressure from those potential new entrants that continues to drive market competitiveness.[116]

Indeed, in highly dynamic economies, particularly those characterized by scale economies, there can be just as much reason to be concerned about *too many* competitors as by *too few*. Further, these dynamic markets tend to see a continual rebalancing between equilibrium and disruption:

> With dynamic competition, new entrants and incumbents alike engage in new product and process development and other adjustments to change. Frequent new product introductions followed by rapid price declines are commonplace. Innovations stem from investment in R&D or from the improvement and combination of older technologies. Firms continuously introduce product innovations, and from time to time, dominant designs emerge. With innovation, the number of new entrants explodes, but once dominant designs emerge, implosions are likely, and markets become more concentrated. With dynamic competition, innovation and competition are tightly linked.[117]

Thus, in any given market at a given time, there is likely some optimal number of firms that maximizes social welfare.[118] That optimal number—which is sometimes just one and is never the maximum possible—is subject to change, as technological shocks affect the dominant paradigms controlling the market.[119] The optimal number of firms also varies with the strength of scale economies, such that consumers may benefit from an increase in concentration if economies of scale are strong enough.[120] Therefore, in dynamic markets characterized by high fixed costs and strong economies of scale, like broadband markets, the optimal number of firms is reached much more quickly than in, for instance, relatively more commodity-like markets.

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of Antitrust Analysis in Dynamically Competitive Industries, in 2 INNOVATION POLICY AND THE ECONOMY 1, 3 (Adam B. Jaffe, et al., eds. 2002) ("The defining feature of new-economy industries is a competitive process dominated by efforts to create intellectual property through R&D, which often results in rapid and disruptive technological change.").

[116] *See generally* BAUMOL, PANZAR & WILLIG, *supra* note 22.

[117] Sidak & Teece, *Dynamic Competition*, *supra* note 23, at 585, 604.

[118] For a discussion of this principle and how it applies to broadband markets, *see* T. Randolph Beard, George S. Ford, Lawrence J. Spiwak, & Michael Stern, *The Law and Economics of Municipal Broadband*, 73 FED. COMM'CNS L.J. 1 (2020) [hereinafter, "Beard, Ford, Spiwak & Stern"].

[119] *See* Rabah Amir, *Market Structure, Scale Economies and Industry Performance* (CORE Discussion Paper No. 2003/65 Sept. 1, 2003), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=995721.

[120] *See* Demsetz, *Why Regulate Utilities?*, *supra* note 62. *See also* Ganapati, *supra*, note 78 (noting that increased concentration results from a beneficial growth in firm size in productive industries that "expand real output and hold down prices, raising consumer welfare, while maintaining or reducing their workforces, lowering labor's share of output.").

A. Broadband markets are dynamic markets

Broadband has many of the attributes of a dynamic market, which tends to make static analyses of broadband competition fail to accurately appreciate competitive realities.[121] Broadband markets are highly driven by technological trends and can be disrupted by rapid modal shifts (e.g., from DSL to cable, or, looking forward, from cable to 5G wireless). Moreover, the infrastructure necessary to deliver broadband requires both long-term planning as well as high long-term investment. Firms in broadband markets are driven not merely by potential entrants today, but by the necessity of intense and expensive planning for future shifts in technology and consumption preferences. Thus, firms operate with an eye toward future competitive pressures, not merely in response to winning market share in the present.

Contrary to some assumptions, the U.S. broadband market is characterized by a significant amount of entry (and exit). As Connolly & Prieger find,

> The striking conclusion is that there is a tremendous amount of dynamic activity in the US broadband market. In the national market, the entry rate averages 14-19% annually, which is greater than the entry rates the economic literature has found for many other industries. The exit rate for broadband is also higher than for other industries, but not as high as the entry rate, so that net entry averages 3.1% annually. With narrower geographic or service type market definitions, the entry rates average from 24% to an astounding 49% per annum.[122]

Thus, broadband providers must balance the need to offer attractive pricing in response to immediate competitive pressures with the simultaneous need to make risky and costly investments in technological upgrades in order to compete with advanced technologies that may not be implemented for a decade or more.

From a dynamic perspective, it is not a problem for prices to increase as higher speed tiers are introduced. Indeed, even where prices increase, the effect of those increases needs to be weighed against the long-term investment in innovation that may ultimately reduce overall costs for service. That is to say, rather than designing service in a way that taxes low-usage consumers to fund extravagant connections for high-usage consumers, higher prices on faster tiers enable providers to cross-subsidize buildout and adoption by low-demand marginal consumers. An analysis of the competitiveness of a particular broadband market should not be restricted to short-term static price considerations;

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[121] *See generally* J. Gregory Sidak & David J. Teece, *Innovation Spillovers and The "Dirt Road" Fallacy: The Intellectual Bankruptcy of Banning Optional Transactions for Enhanced Delivery Over the Internet*, 6 J. COMP. L. ECON. 521, 540 (2010) (Discussing the broad array of factors that must be taken into account in a dynamic analysis of the Internet and broadband service).

[122] Connolly & Prieger, *A Basic Analysis of Entry and Exit in the US Broadband Market, 2005-2008*, *supra* note 82 at 4.

a full analysis must also consider capital expenditures and long-term investments in technological and business-process innovation.[123]

Just as market share is a poor indicator of competition, basic accounting measures of profitability and investment often fail to demonstrate how risk/return expectations are realized over the entire innovation lifecycle in dynamic markets. A very large and very profitable ISP may have experienced prior negative returns on invested capital, a result of the need to assume risk and make enormous investments under conditions of uncertainty. The broadband market is constantly evolving as a result of historical and ongoing infrastructure investment, rapidly changing technology, the evolution of content and content-delivery technology, new regulations, and shifting usage patterns, among other factors. Facilities-based competition (e.g., between fiber, cable, mobile, and satellite) has ebbed and flowed depending on these various characteristics, but it has consistently produced higher quality connectivity at lower quality-adjusted prices. An accurate assessment of competitiveness in broadband markets must take account of all these characteristics.

Further, it is well-known that process and product innovation does not arise solely from new entry; incumbent firms frequently are important sources of innovation, as well as increased market competitiveness.[124] Dynamic analysis *does* take entry seriously, but it is much more sensitive to *potential* entry as a constraint on incumbents than a structuralist view would permit. Thus, for example, an incumbent broadband provider that offers a 100 Mbps tier must consider the potential capabilities of an existing competitor that only offers 10 Mbps service; it must incorporate potential threats from that competitor in its decision matrix when evaluating whether to upgrade its network to 1 Gbps in order to retain its customer base. An incumbent's dominant position can quickly erode thanks to imperfect in-market substitutes, as well as from out-of-market firms that may decide to enter in the future.[125]

B. Idiosyncratic features of broadband markets

There are idiosyncratic features of broadband markets that feed directly into innovation and investment strategies for providers, and that must be taken seriously in a dynamic competition analysis.

Obviously, costs factor into supply-side decisions. Holding demand constant, one would expect fewer firms where the costs of production are higher. For broadband, as with electricity and telephone before it, population density is an important factor on the supply side. It is more costly per-subscriber

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[123] A recent example highlights the need to take long-term investment and planning seriously. Without the necessary investment in networks *long* before the pandemic, there is no way networks could have responded so quickly to the COVID-19 pandemic-induced broadband demand. Indeed, FCC data shows that broadband providers continue to heavily invest. See 2020 Communications Marketplace Report, *supra* note 14. In 2018, broadband providers invested approximately $80 billion, up from $70 billion in 2016. *See id.*, at ¶ 106.

[124] *See generally* NICOLAI J. FOSS & PETER G. KLEIN, ORGANIZING ENTREPRENEURIAL JUDGMENT (2012).

[125] *See, e.g.*, Sidak & Teece, *Dynamic Competition*, *supra* note 23, at 615.

to create a broadband network over a larger space than it is over a smaller space.[126] Holding all else constant, one would expect less quantity supplied at any given price point of broadband in a rural area than in a more populated city center or suburb. Thus, consistent with economic theory, there is an urban-rural divide in broadband.[127] Cities tend to have faster available speeds and more firms providing broadband than rural areas. The FCC's latest Broadband Deployment Report shows that, in 2019, high-speed Internet was available to about 95.6 percent of the population through fixed terrestrial technologies like cable, including about 82.7 percent of the rural population.[128]

Similarly, geography is an important factor determining the cost to provide broadband. It is harder to wire a network over a mountain than over a plain. Receiving a signal from a tower for wireless access is more difficult when there is a hill in the way.

High fixed costs associated with the creation of broadband networks help to explain how many firms will enter any given market. Low population density and geographical limitations make it more costly to enter a market. Conversely, high population density and favorable terrain make it cheaper to enter. Regardless of policy choices, these limitations will continue to apply. Subsidies designed to increase availability of broadband in rural areas can help spur buildout to those areas where it would otherwise be unprofitable to enter,[129] but they would not change the underlying cost of production—just how it is financed.

There are also policy reasons that entry is limited in some areas. Many local governments require new entrants to provide various "public interest" benefits, which amount to costly burdens that

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[126] *See, e.g.*, Steve G. Parsons & James Stegeman, *Rural Broadband Economics: A Review of Rural Subsidies*, CostQuest Associates Research Paper (Jul. 13, 2018), *available at* https://www.ustelecom.org/wp-content/uploads/2018/11/Rural-Broadband-Economics-A-Review-of-Rural-Subsidies-final-paper-1.pdf.

[127] FCC, *Bridging the Digital Divide for All Americans*, FCC.GOV (last visited Feb. 9, 2021), https://www.fcc.gov/about-fcc/fcc-initiatives/bridging-digital-divide-all-americans. *See also* Brent Skorup & Michael Kotrous, *Narrowing the Rural Digital Divide with Consumer Vouchers*, Mercatus Center Policy Brief (Oct. 2020), *available at* https://www.mercatus.org/system/files/skorup_and_kotrous_-_policy_brief_-_narrowing_the_rural_digital_divide_with_consumer_vouchers_-_v1_1.pdf (discussing the rural/urban split).

[128] Fourteenth Broadband Deployment Report, *supra* note 14, at 24 fig.4 (limitations to note: Facilities-based broadband providers report deployment data to the FCC using Form 477. Form 477 data is self-reported and resolves to the census block, which has its own limitations. Ultimately, the estimates won't be far off from 96%). *C.f. FCC Form 477 Local Telephone Competition and Broadband Reporting Instructions*, OMB Control No. 3060-0816, *available at* https://transition.fcc.gov/form477/477inst.pdf.

[129] FCC, *Universal Service*, FCC.GOV (last visited May 11, 2021), https://www.fcc.gov/general/universal-service.

reduce entry.[130] In other cases, the cost of gaining access to rights-of-way and permits for pole attachments attenuate the full scope of potential deployment.[131]

On the demand side, the biggest factors have to do with consumers' willingness and ability to pay.[132] Higher-income individuals tend to be more able to afford broadband access than those with lower incomes. Younger individuals who understand the uses of the Internet tend to be more willing to pay than elderly individuals who see less advantage. Select groups (e.g., the Amish) who don't use modern technology obviously would not register as demand for high-speed Internet access. As a result, comparisons of local markets must take these factors into consideration.[133]

And it is important to remember that the market process itself is not static.[134] When factors change—whether a change in demographics or population density, or other exogenous shocks that change the cost of deployment—there will be corresponding changes in available profit opportunities. Thus, while there is a hypothetical equilibrium for each market—the point at which the entry of a new competitor could reduce consumer welfare—it is best to leave entry determinations to the market process.

III. Municipal broadband and misallocated broadband investment

One of the Broadband for America's Future Report's primary policy recommendations is to introduce municipal broadband providers in markets deemed "too concentrated."[135] Indeed, calls to

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[130] *See* Berin Szoka, Jon Henke, & Matthew Starr, *Don't Blame Big Cable. It's Local Governments That Choke Broadband Competition*, WIRED (Jul. 16, 2013), https://www.wired.com/2013/07/we-need-to-stop-focusing-on-just-cable-companies-and-blame-local-government-for-dismal-broadband-competition/.

[131] *See, e.g.*, Kristian Stout & Ian Adams, *Comments in the Matter of Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment*, ICLE (Sept. 2, 2020), *available at* https://laweconcenter.org/resource/comments-in-the-matter-of-accelerating-wireline-broadband-deployment-by-removing-barriers-to-infrastructure-investment/.

[132] *See, e.g.*, Octavian Carare, Chris McGovern, Raquel Noriega, & Jay Schwarz, *The Willingness to Pay for Broadband of Non-adopters in the U.S.: Estimates from a Multi-state Survey*, 30 INFORMATION ECON. & POL'Y 19 (2015). Though historical patterns of segregation and other factors that impact educational attainment and socioeconomic outcomes can affect the willingness and ability to pay, as well. *See* C.G. Reddick, R. Enriquez, R.J. Harris, & B. Sharma, *Determinants of Broadband Access and Affordability: An Analysis of a Community Survey on the Digital Divide*, 106 CITIES (2020), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7480260/.

[133] The FCC uses "updated demographics data for the United States and the 28 comparison countries on a sub-national basis, including the latest figures for such indicators as population size, population density, gross domestic product (GDP), and educational attainment" in order to make cross-county comparisons. See FCC, SIXTH INTERNATIONAL BROADBAND DATA REPORT (Feb. 2, 2018) at ¶ 22, https://www.fcc.gov/reports-research/reports/international-broadband-data-reports/international-broadband-data-report-4. Once adjustments are made to account for differences in these factors, the U.S. compares very favorably internationally. *See generally id.*

[134] *See, e.g.*, Sidak & Teece, *Dynamic Competition*, *supra* note 23; ISRAEL M. KIRZNER, COMPETITION AND ENTREPRENEURSHIP (1978); JOSEPH SCHUMPETER, CAPITALISM, SOCIALISM, AND DEMOCRACY, Chs. VII and VIII (1942) (analyzing "creative destruction").

[135] *See* Broadband for America's Future Report, *supra* note 7, *at* 54-59.

experiment with municipal broadband have been growing even for otherwise well-connected cities.[136] According to the Broadband for America's Future Report, municipal broadband can, in at least some cases, significantly improve consumer welfare:

> In 2018, a study from Harvard's Berkman Klein Center for Internet & Society examined the pricing patterns that result from the entry of community-owned fiber networks. Although careful to note the limitations of its data, the study concluded that benefits from additional competition among networks that offered at least 25/3 broadband "ranged from a savings of 2.9 percent, or $19, annually in Tullahoma, Tennessee, to more than 50 percent, or $600, annually in Lafayette, Louisiana," a figure that is likely to be atypical. In twelve cases a community-owned fiber network offered entry-level prices 20 percent or more lower than its private competitors. In four cases private providers were the lowest, ranging "from a 6.9 percent, or $50, [annual] saving for users of Charter Spectrum in Jackson, Tennessee, to about a 30.5 percent, or $298, [annual] saving, also for users of Charter Spectrum, in Churchill, Nevada."[137]

But the Berkman Klein Center study's authors acknowledge numerous hurdles that make generalizable comparisons between municipal fiber and private providers difficult.[138] This includes difficulties gathering data on providers,[139] as well as difficulties finding apples-to-apples comparisons between providers where different contract terms apply (e.g., where one provider used "teaser" pricing or offered periodic discounts, and another offered a flat rate over the entire term).[140] Ultimately, the study was able to make some level of comparison in 23 instances, but its top-line suggestions were more focused on a need for providers to make pricing terms clear, rather than a strong declaration that municipal fiber was a broadly desirable solution.[141] Indeed, in the study's final paragraphs, the authors pose more questions on these topics than they answer.[142]

A. Where municipal broadband can and cannot work

We do have some theory and data to guide policymaker decisions on when municipal networks are advisable or, indeed, even viable. Christopher Yoo and Timothy Pfenninger have provided among the most comprehensive analyses to date of the financial prospects for municipal networks. They

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[136] Ryan Johnston, *Chicago, Denver Voted to Take Broadband 'Seriously' on Tuesday*, STATESCOOP (Nov. 5, 2020), https://statescoop.com/chicago-denver-voted-to-take-broadband-seriously-on-tuesday/.

[137] Broadband for America's Future Report, *supra* note 7, at 49.

[138] *See* David Talbot, Kira Hessekiel, & Danielle Kehl, *Community-Owned Fiber Networks: Value Leaders in America*, Berkman Klein Center for Internet & Society Research Publication (Jan. 2018) at 13, *available at* https://dash.harvard.edu/bitstream/handle/1/34623859/2018-01-16-Pricing.final.pdf.

[139] *See id.*

[140] *See id.* at 6.

[141] *See id.* at 13.

[142] *See id.*

note some success stories,[143] but those successes are far rarer than the failures. Even setting aside those expensive municipal networks that failed and were sold at a loss,[144] Yoo and Pfenninger's analysis casts serious doubt on the prospects for municipal networks on the whole:

> Municipal fiber is not an option for the 86 percent of the country that is not served by a municipal power utility. Of the 20 municipal fiber projects that reported the results of their municipal fiber operations separately, eleven generated negative cash flow. Unless operations improve substantially, these projects cannot continue to operate over the long haul, let alone cover the capital costs needed to establish operations.[145]

There have been criticisms of the Yoo and Pfenninger study,[146] with some pointing to the successes of, for example, Chatanooga, Tennessee, and Wilson, North Carolina, as examples of how municipal fiber can be made to work.[147] Other criticisms focus on the limited data set, which often includes only the first five years of a municipal fiber provider's operation.[148] This period typically predates sufficient user adoption to push revenues up to a level where costs can be recouped and profit realized.[149] These are fair critiques; we do not have enough information to say for certain that municipal broadband is an inevitable failure, and there are surely specific instances where municipal fiber *might* be made to work.[150] But these critiques miss the larger point demonstrated by Yoo and Pfenninger: establishing a successful municipal broadband service is a risky and deeply uncertain proposition,

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[143] Christopher S. Yoo & Timothy Pfenninger, *Municipal Fiber in the United States: An Empirical Assessment of Financial Performance*, Penn Law Center for Technology, Innovation and Competition (Apr. 3, 2017), *available at* https://www.law.upenn.edu/live/files/6611-report-municipal-fiber-in-the-unitedstates-an.

[144] *Id.* at 2 n. 4.

[145] *Id.* at 23.

[146] *See, e.g.*, Eric Null & Amir Nasr, *Christopher Yoo's Municipal Broadband Report Misleads on Viability, Success of Municipal Fiber Networks*, NEW AMERICA (Jul. 9, 2017), https://www.newamerica.org/oti/blog/christopher-yoos-municipal-broadband-report-misleads-viability-success-municipal-fiber-networks/; Christopher Mitchell, *Correcting Community Fiber Fallacies: Yoo Discredits UPenn, Not Municipal Networks*, Institute for Local Self-Reliance Community Networks Initiative (June 2017), *available at* https://muninetworks.org/sites/www.muninetworks.org/files/fiber-fallacy-upenn-yoo.pdf.

[147] *See, e.g.*, Mitchell, *id. But see* Beard, Ford, Spiwak & Stern, *supra* note 118, at 10, 43, 45 (describing Chattanooga's "success").

[148] *See* Null & Nasr, *supra* note 146 ("The narrow timeframe combined with studying the early years of many of the networks limits the usefulness of the report's conclusions. The report focused on financial data covering 2010-2014, when all but three of the studied networks were under 10 years old, and one network was 3 years old. The early years of network implementation require heavy investment and cash flow will reflect that. Further, it may take years to connect customers and thus gain the cash flow from those subscriptions. Focusing on those years will likely create a misleading financial picture and will make 'viability' determinations and predictions of success or failure difficult.").

[149] *Id.*

[150] It is also important to note that, overall, municipalities deploying fiber tend to be *much* smaller than cities like Chattanooga. One-third of municipalities deploying broadband had fewer than 10,000 residents, and 82% had fewer than 50,000 residents. Beard, Ford, Spiwak & Stern, *supra* note 118, at 26. Thus, even where municipal broadband may make sense, it tends to be for smaller communities facing buildout issues due to challenges connecting to larger networks. This reinforces the point that municipal broadband is at best a consideration for particular use cases and should not be a first-choice policy priority.

and one marked by certain unavoidable attributes that make it clearly inappropriate in a wide range of circumstances.

Only a small number of municipalities are likely to be well-positioned to offer fiber at all. Most commonly, these are municipalities that also offer an electric utility, whose operations may be used to cross-subsidize municipal broadband. The potential for municipal fiber to serve as a policy solution to expand broadband access is therefore already constrained, even before one considers the particular circumstances of a given local market. Even among the municipal fiber projects that have been claimed as successes, repaying the project costs at current cash-flow will take over 400 years, even with significant subsidies and cross-subsidization helping to spur growth.[151]

The Yoo and Pfenninger study's contribution to this area of research was to estimate the likelihood that a new entrant would be able to sustainably build and operate a municipal fiber network. According to Yoo and Pfenninger:

> If a hypothetical project were to achieve the same results for the first 14 years of its existence as the average of the projects in our dataset, it would have an aggregate negative discounted cash flow of more than $705 per household. Taking into account the median project cost of $2,215 per household, a hypothetical project that achieved the same returns as the projects in our dataset would lose more than $2,920 per household during its first 14 years.[152]

In short, for the *average* municipality, it's far from a sure bet to deploy a government-run fiber network.

Beard, Ford, Spiwak & Stern reinforce Yoo and Pfenninger's findings.[153] They note that the "economics predict (and the evidence confirms) that municipal broadband is in almost all scenarios *subsidized entry*, covering capital costs and losses with tax dollars and other internal transfers."[154] But for the subsidization most municipal networks would be unable to function profitably. In Chattanooga, for example, the municipal fiber project depended on a subsidy of nearly $2,000 per subscriber. Bristol, Virginia, relied on direct subsidies of $7,000 per subscriber.[155] And in Lafayette, Louisiana, the city's auditor discovered large, possibly illegal cross-subsidies among city services to prop up the broadband network's financial performance.[156]

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[151] Yoo & Pfenninger, *supra* note 87, at 19-20 (on Chattanooga).

[152] *Id.* at 14.

[153] C.f. Beard, Ford, Spiwak & Stern, *supra* note 118.

[154] *Id.* at 10.

[155] *Id.* at 43.

[156] *Id.* at 10-11.

Indeed, there is good reason that municipal entry must be heavily subsidized. According to one estimate, building a municipal network

> costs public providers an additional $15.6 million to install a municipal network. Public providers typically only operate within the geographic boundaries of their municipality. Therefore, they are unable to take advantage of economies of scale as private firms do, such as in customer service, billing, and marketing. Further, private firms that operate on a larger scale likely face lower costs through learning by doing; public firms that only enter a single market do not have this opportunity. But, most of all, the additional costs faced by public entities likely represent the substantial burden of convincing constituents to undertake such an endeavor, as well as other political, legal, and administrative costs. These barriers are reflected in the extraordinarily high costs I estimate, which in turn rationalize municipalities' low rate of entry.[157]

Notably, this cost to municipalities is compared to an estimate of the industry median of between $1.5 million and $2.8 million.[158] Again, this makes sense since private industry is able to rely on a much larger set of efficiencies in order to more cost-effectively deploy networks.

Further, if the concern over broadband deployment is about increasing the number of competitors beyond one or two, introducing municipal broadband (or even the threat of introducing such) may perversely drive some markets into a monopoly provider position. According to Beard, Ford, Spiwak & Stern, the economics of subsidized broadband necessarily drives down the number of competitors:

> In the long-run, either the municipal entrant will fail or a private provider will exit or materially reduce its investments. Municipal systems regularly obtain significant market shares and often remove a major anchor tenant (the government) from private networks, thereby weakening the economic case for private investment in upgrades.[159]

Assuming there are no market distortions that disrupt potential entry (e.g., rights-of-way difficulties, franchising restrictions), the number of firms offering broadband in a given market is likely to be at or close to an optimal level, given both local consumer demand and the prices firms can offer based on costs. If there was slack in the market, new firms already would have seized the profit opportunity. Thus, a municipality faces an immediate constraint: if the market already contains the natural quantity of competitors to fit local costs and user demand, the municipal broadband offering would either need to have lower costs or it would need to price its service below-cost in order to entice more consumers.

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[157] Kyle Wilson, *Does Public Competition Crowd Out Private Investment? Evidence from Municipal Provision of Internet Access*, Working Paper (Mar. 22, 2021) at 38, https://ssrn.com/abstract=2848569.

[158] *Id.* at 27. These figures are based on an estimate reported by Charter Communications. *Id.* Wilson's own estimate is in the range of $2.3 million and $9.2 million.

[159] *Id.* at 11.

Of course, new technologies or management structures could be devised to control costs, and thus a new provider would be able to profitably lower prices. But if this is true for a municipality, it should also be true for a private firm that has not yet entered the market. The municipality could save on the tremendous costs of buildout and management by pointing this out to a new firm and inviting them to enter their market.

B. The risk of misallocated broadband investment

Unless we assume that a municipality somehow has unnatural business acumen or a technological advantage over private operators, the market's economic constraints will require that either 1) the municipality operates the service at a loss or 2) the municipality cross-subsidizes the service from other areas of government (which is just another way of saying it operates at a loss). The long-run implications are obvious. If the municipality can sustain the losses and subsidies for long enough, private competitors in the market eventually will exit, as they will be unable to offer their service at the below-cost rate.

As incumbent private providers face downward pressure on investment, they will seek to extract as much value from sunk costs as possible before being forced to exit. The benefits of true competition—from both actual and potential competitors—to inspire a positive feedback investment cycle are therefore reversed. The continued upgrade and maintenance of the remaining municipal system will be at the discretion of city managers, instead of being driven by competitive forces.

The only thing that would save the municipality from being accused of predatory pricing would be if it indefinitely maintained the artificially low prices—essentially functioning as a stealth regressive broadband tax on *all* taxpayers, regardless whether they use broadband or whether they need the highest available speeds. Indeed, this sort of cross-subsidization appears to be widespread.[160]

Moreover, since municipal broadband is most frequently offered in relatively rural or otherwise unconnected areas, the effect of municipal entry could reduce competition to actual monopoly (either government owned, or if the municipality fails, a private monopoly that purchases the municipality's distressed assets)—a perverse outcome for policies intended to draw a larger number of competitors to a market.[161]

Municipal entry may also deter private entry in[162] Municipal broadband often focuses on the city centers of areas in which it enters. But public investment in city centers can reduce private providers'

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[160] Beard, Ford, Spiwak & Stern, *supra* note 118, at 45-46 (noting that, even after accounting for allocating cost savings to electric utilities, captive electricity ratepayers end up overwhelmingly footing the bill for debt service on costly municipal broadband deployment).

[161] *Id.*, at 37-38 n. 95.

[162] Ben Sperry, *Doublespeak in the Debate About Rural Broadband Buildout*, TRUTH ON THE MARKET (Aug. 6, 2020), https://truthonthemarket.com/2020/08/06/doublespeak-in-the-debate-about-rural-broadband-buildout/.

profitability and result in less investment in rural areas on the outskirts of town. Most internet providers rely on profits from providing lower-cost service to higher-population areas (like city centers) to cross-subsidize the higher cost of providing service in outlying and rural areas. But municipal providers generally only provide the city-centered municipal service—that is, they only provide the lower-cost/higher-profit service.

This hits the carriers that serve higher-cost areas with a double whammy. First, every customer municipal providers take from private carriers cuts the revenue on which those carriers rely to provide service elsewhere. Second, and even more troublingly, because municipal providers have lower costs (because they tend not to serve the higher-cost outlying areas), they can offer lower prices for service. This "competition" exerts downward pressure on private firms' prices, further reducing revenue across their entire in-town customer base. This results in less funding available for buildout into the more rural outlying areas and in higher prices to rural users in order to justify offering service at all in those areas.

Proposals to offer municipal broadband as a means to increase broadband adoption (by either increasing supply or lowering prices) put the cart before the horse. As Beard, Ford, Spiwak & Stern correctly note, in a market equilibrium, the private goods of broadband use and broadband provision are distinct from the public goods created by wider general adoption of broadband.[163] Private supply and demand curves are usually sufficient to guarantee creation of adequate broadband networks (note, not *maximally fast* broadband networks) throughout the United States. Some uneconomic locations—the unserved areas—may need interventions in order to guarantee service. Municipal broadband is surely *an* option to subsidize hard-to-reach consumers, but as discussed below, it is not the *only* option, nor the best. Municipal broadband should be reserved as a solution of last resort, used only when no private provider can reach a given area.

IV. Practical solutions to encourage broadband deployment and adoption

Proposed solutions to the purported "problems" of broadband market concentration and lack of competition are, as we have discussed, misguided. Artificially introducing more competitors into a market simply for the sake of having more competitors is unlikely to yield positive welfare results and virtually certain to impose very real costs. But that doesn't mean there are no legitimate objectives that public policies could plausibly accomplish.

Most charitably, even those who advocate for "more providers" are presumably interested in furthering what should be the ultimate goals of broadband policy: expanding broadband deployment to reach users who currently have no access and facilitating greater broadband adoption among those who have access to broadband service but are impeded from using it. As Beard, Ford, Spiwak &

[163] Beard, Ford, Spiwak & Stern, *supra* note 118, at 16.

Stern note, it is *growing the size of the market*—not forcing more firms into a market—that is, and should be, the proper goal of broadband policy.[164] Policymakers should therefore think about what policies in a given area will best reduce or redistribute the costs of deployment, either to ensure that service is available in the first place, or to reduce the costs to consumers (whether financial or otherwise) of using already-available broadband services.[165]

While critics of the broadband market do not make a convincing case that broadband competition fails to provide optimal levels of connectivity at competitive prices, there is certainly more that could be done to encourage faster rollout, broader adoption, and better prices for consumers. Most of all, these solutions must focus on the unserved, and find efficient and effective ways to deploy sufficient broadband service to the 4.6% of Americans who currently lack it. Several potentially sound approaches to promote broadband deployment are discussed below.

A. Create a cooperative pathway for entry and buildout

Expanding access in unserved markets requires delicately balancing incentives. Incumbents justifiably will resist new government-subsidized competition—for example, via a municipal network—but new competitive entry is unlikely where incumbents are already backed by government subsidies or operated by tax-funded municipal agents.

Both the Cable Act and the Telecommunications Act employ competitive and regulatory frameworks that offer useful carrots and sticks, and that can serve as a model to achieve this balance. Firms that accept infrastructure funding to build out rural broadband should be subject to reasonable obligations governing how they use that funding. For instance, they could be required to offer a basic tier of broadband service at a price that is reasonably comparable to that offered in urban areas, where private deployment provides a good standard for competitive pricing. Such rules are needed to ensure that government-supported broadband is deployed in ways that further, rather than undermine, basic deployment and access policies.

But such constraints (and subsidies) are unnecessary and costly once markets become competitive. Hence, obligations should be tailored to a specific market's level of competitiveness. As firms meet their obligations and a market becomes more competitive, such obligations should be phased out so that competitive markets are subject to lighter-touch obligations.

B. Adopt a technology-neutral approach

Critics' myopic focus on "future proof" fiber, unnecessary symmetrical bandwidths, and the like threaten to undermine the core purpose of broadband policy: expanding broadband availability and adoption. A focus on expanding the size of the market counsels against proposals that prioritize

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[164] *Id.* at 30.

[165] *Id.* at 32

idiosyncratic technology preferences or other secondary concerns, which are often at odds with the ultimate objective of broadband policy. Broadband policy should offer technology-neutral solutions driven by the specific engineering requirements to fill any gaps that exist between a given community's needs and its current supply. That is to say, policy should not presume that a particular mode of connection is necessarily ideal (e.g., fiber or fixed wireless), nor should it focus on promoting large-scale construction projects or the latest technological trends instead of finding the "right" solution. Rather, networks should be designed by engineers capable of evaluating technical capabilities and limitations to achieve optimal results, given a program's parameters. Of course, such programs could, and should, specify certain reasonable minimum performance and other requirements. But dedicating funds to a specific vision of broadband infrastructure divorced from consumer demand will run into inevitable and avoidable limitations.

Requirements for specific technologies that deliver specific mandated speeds will tend to skew investment away from harder-to-serve areas, where local conditions likely require more flexibility. For example, requiring symmetrical speeds delivered over fiber will deter investment in wireless, fixed-wireless, and satellite solutions that can provide sufficient service in the near- and mid-term.

Many use cases in rural areas require unique mixtures of technologies.[166] Rural farmers typically need to cover hundreds or thousands of square acres in order to reach not just their homes, but accessory buildings and a wide variety of farm equipment.[167] Running a single broadband connection using predetermined technology may or may not result in the most cost-effective and efficient solution for a given rural location. The focus should be on allowing consumers to select and deploy locally appropriate solutions.

Federal and state policy should be receptive to—and supportive of—the provision of broadband service by, among other things, wireless Internet service providers (WISPs) and 5G mobile network providers.[168] WISP technology is promising, but currently limited. It provides line-of-sight access between fixed transmitter stations—typically connected to fiber backhaul—and customer wireless receivers.[169] WISP access is increasingly common in rural areas where full fiber deployment is extremely costly, and where the costs of that deployment are difficult to recoup because of low population density. Federal policy designed to improve access to spectrum could help to promote these

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[166] *See generally* US DEP. OF AGRICULTURE, A CASE FOR RURAL BROADBAND: INSIGHTS ON RURAL BROADBAND INFRASTRUCTURE AND NEXT GENERATION PRECISION AGRICULTURE TECHNOLOGIES (April 2019), *available at* https://www.usda.gov/sites/default/files/documents/case-for-rural-broadband.pdf (describing the wide array of use cases, from drones to row-crop management to general farm management, that occur in the rural/farm context).

[167] *See id.*

[168] *See* Phil Britt, *Wisp Industry Promises Rural Fixed 5G Wireless Thanks to FCC Proposal for Unlicensed 6 GHz Spectrum*, TELECOMPETITOR (Apr. 1, 2020), https://www.telecompetitor.com/wisp-industry-promises-rural-fixed-5g-wireless-thanks-to-fcc-proposal-for-unlicensed-6-ghz-spectrum/.

[169] *See* James Sanders, *Why Wireless ISPs are Still Necessary in the Age of 5G*, TECHREPUBLIC (Apr. 22, 2019), https://www.techrepublic.com/article/why-wireless-isps-are-still-necessary-in-the-age-of-5g/.

technologies. In the same vein, 5G technologies hold tremendous promise to become substitutes to wired broadband access, particularly in areas where dense deployment is possible (like cities and dense suburban areas). As the demand for 5G grows, other frequency bands will be required to support the large bandwidth and high data rates users will need. High frequency bands in the spectrum above 24GHz—sometimes referred to as mmWave because of the short wavelengths that are measured in millimeters—offer great potential to facilitate usage in a 5G world.[170]

Technology-specific mandates, moreover, have been shown by the recent pandemic to be wholly unnecessary.[171] Asymmetric broadband networks delivered over a range of technologies have performed beyond expectations. Unless there emerges new evidence to suggest a flexible-use approach to broadband networks is inadvisable, U.S. policy should continue to encourage diverse approaches to broadband infrastructure deployment based on relevant local conditions.

To the extent policymakers want to ensure that core network infrastructure can support future needs, technology-specific appropriations should be limited to requiring conduit or dark fiber to be installed along roads supported by broader infrastructure spending. Such "dig once" policies—like that proposed by Reps. Anna Eshoo (D-Calif.) and David McKinley (R-W.Va.) in the Nationwide Dig Once Act of 2020,[172] and included in the 2020 Moving Forward Transportation Act[173]—are a cost-effective way to enable future expansion of broadband capabilities without making wasteful, excessive, and distortionary expenditures.

By installing and leasing dark fiber to private providers such dig once initiatives may help to facilitate new entry.[174] A city-owned dark fiber network can be leased out to private providers to deploy last-mile connections and manage customer service relationships. A municipality acting as a middle-mile provider by building a limited network that provides services only to certain institutions (for instance, to support smart infrastructure) can also be a useful alternative to full municipal ownership of a network system.[175] In this arrangement, private broadband providers build lateral connections

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[170] *The Emergence of 5G mmWave*, ACCTON (last visited May 12, 2021), https://www.accton.com/Technology-Brief/the-emergence-of-5g-mmwave/.

[171] *See* BITAG Pandemic Report, *supra* note 10.

[172] Nationwide Dig Once Act, H.R. 7205, 116th Cong. § 2 (2020), *available at* https://www.congress.gov/116/bills/hr7205/BILLS-116hr7205ih.pdf.

[173] Moving Forward Act, H.R. 2, 116th Cong. § 2 (2020), *available at* https://www.congress.gov/116/bills/hr2/BILLS-116hr2rds.pdf.

[174] In this, we agree with Sallet. *See* Broadband for America's Future Report, *supra* note 7, at 52 ("One approach involves local governments adopting and executing policies to encourage private-sector deployment by reducing the costs incurred by broadband network providers. Here, local leaders, private industry, nonprofits, and municipal governments work together to identify community needs, local resources and assets, and steps necessary to deploy broadband networks. With planning in hand, a locality can adopt a package of economic-development incentives, redesign local administrative processes to streamline deployment logistics, or otherwise reduce barriers to entry.").

[175] *See id.* at 55 (citing Fairlawn, Ohio as an example of a municipality providing services only to certain institutions as an alternative to full ownership).

that can be used to facilitate last-mile connections. This hybrid solution allows the municipality to run its own private network that potentially saves on broadband subscription fees, while also allowing private providers to build out more extensive networks to customers and manage their ongoing relationships. Certainly, this arrangement could avoid some of the problems endemic to full municipal ownership of broadband, such as managing last-mile connections and customer service, but it would still elevate the risk of ownership and management for the municipality.[176]

Lawmakers should likewise see to it that subsidies, the subject of the next section, are also technology neutral. As detailed at length above, it is impossible for a policymaker to know ex ante the ideal number of competitors in a local market. Policymakers also cannot know ex ante what kinds of networks would be best on average, let alone for specific locations. Although it may be tempting to fund the buildout of large fiber networks, it is simply not the case that fiber to every home or business makes sense, either in terms of consumption patterns or in terms of the economic and practical constraints on buildout. The technology should fit the local circumstances. In a dense city, for example, fiber backhaul and 5G nodes may be sensible; in a remote rural area, WISPs are likely a better option. The superior subsidy program will be one that retains the investment incentives for private actors to carefully understand localities and to deploy appropriate technology.

C. Employ subsidies and connectivity vouchers

One of the best and most direct means to stimulate broadband deployment and consumption is through the use of subsidies. Indeed, most of the gains from subsidization occur when it is directed at unserved households (as opposed to subsidizing overbuilding on existing networks).[177]

Municipal broadband is a form of subsidized entry but, barring exceptional cases where *no* provider operates in a given area, it would be far more economically sensible to subsidize either existing providers to stimulate investment in more extensive deployment, or else to subsidize consumers to facilitate purchasing more access to faster broadband (which would also provide incentive for existing providers to expand their footprints).[178]

One economic justification of subsidies is that they are necessary to capture the positive externalities of universal connectivity which broadband providers are insufficiently incentivized to produce, due

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[176] *See id.* at 54-55 (citing problems with elevated risk in Champaign and Urbana, Illinois, and Westminster, Maryland).

[177] *See* Austan Goolsbee, *Subsidies, the Value of Broadband, and the Importance of Fixed Costs in* BROADBAND: SHOULD WE REGULATE HIGH-SPEED INTERNET ACCESS? (Robert W. Crandall & James H. Alleman, eds. 2003) at 279-80 ("An investment subsidy potentially extends the product to users with particularly high valuations who previously did not have access; therefore, its efficiency cost is much smaller as a share of revenue.").

[178] *See, e.g.*, Nuechterlein & Shelanski, *supra* note 37, at 256-57 ("By shifting a portion of cost-recovery from users to taxpayers, [municipal broadband networks] may create attractively low—*i.e.*, predatory—retail prices in the short term. But over the longer term, they suppress the investment incentives of all unsubsidized competitors and potentially drive them from the market, leaving taxpayers holding the bag.").

to lack of profitability in some markets.[179] Subsidies can also be useful as a means to reduce the elevated risk and upfront costs that make some locations uneconomic to reach. Thus, subsidies to promote buildout to areas with low population density, or to help potential consumers adopt the technology where the barrier is ability to pay in relation to the costs of buildout, could be important to achieving universal connectivity.[180]

Subsidies can take the form of direct payments to providers or vouchers to consumers for the purchase of broadband. Past efforts to close the digital divide have focused on supply-side subsidies, allocating funds to whichever firms promise to connect the most consumers at the lowest upfront capital investment.

Current subsidy programs rely heavily on government direction to decide where to build, what to build, and how much to spend to do it.[181] These programs have been criticized for "wasteful overhead spending, complex eligibility requirements for providers, and substantial inequities in fund disbursements between similarly situated states and regions. . . ," as well as a lack of "accountability to the public and government auditors."[182]

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[179] *See* Beard, Ford, Spiwak & Stern, *supra* note 118, at 10 ("Broadband policy is motivated by a positive externality. As a consequence of positive third-party effects (to the extent they exist), the private incentives of consumers to pay for and the private incentives of firms to deploy the "right amount" of broadband are systematically too low from a social perspective. Disappointment in the deployment and adoption of broadband is guaranteed absent an effective policy to close the gap between private and social benefits. Competition is not a solution to the externality problem, so the competition justification for municipal broadband is misguided. Traditionally, externalities are dealt with by using subsidies to alter private incentives so that they coincide with the social perspective, thereby increasing consumer welfare."); *see also id.* at 15-17.

[180] *See* Parsons & Stegeman, *supra* note 126 (explaining the rationale for subsidies to achieve universal service, primarily by making it economic to build out into low density areas). *See also* FCC, *In the Matter of the Emergency Broadband Benefit Program*, WC Docket No. 20-445 (Feb. 25, 2021), *available at* https://docs.fcc.gov/public/attachments/FCC-21-29A1.pdf (expanding access to $50/month for low-income households for broadband service, as well providing as one-time discount of up to $100 on a computer or tablet for eligible homes). Note, however, that not all connectivity issues are a matter of price (or not primarily a matter of price). A significant number of users do not value an Internet connection enough to justify its cost. *See generally* George S. Ford, *Confusing Relevance and Price: Interpreting and Improving Surveys on Internet Non-Adoption*, 45 TELECOMM POLICY (Mar. 2021) (discussing how consumer willingness to pay accounts for an important share of non-adoption). A 2010 review of broadband adoption following the American Recovery and Reinvestment Act stimulus funding revealed various reasons beyond price that households fail to adopt broadband, including lack of access to a computer and simple lack of interest in using the Internet. *See* Janice A. Hauge & James E. Prieger, *Demand-Side Programs to Stimulate Adoption of Broadband: What Works?*, 9 REV. IND. ORGAN. 1 (2010).

[181] *See* FCC, *In the Matter of the Connect America Fund, A National Broadband Plan for Our Future, Establishing Just and Reasonable Rates for Local Exchange Carriers, High-Cost Universal Service Support, Developing an Unified Intercarrier Compensation Regime, Federal-State Joint Board*, FCC-11-161 (Nov. 18, 2011), https://www.fcc.gov/document/fcc-releases-connect-america-fund-order-reforms-usficc-broadband (reforming the USF and ICC for broadband and establishing the Connect America Fund).

[182] *See* Skorup & Kotrous, *supra* note 70, at 2.

Further, as noted above, in many cases it is geographic and other economic factors that most severely affect the rollout and adoption of broadband.[183] According to an analysis of the factors that drive broadband adoptions by George Ford, Thomas Koutsky, and Lawrence Spiwak, "broadband adoption is intimately tied to demand-side factors like income inequality and education, and policies directed at those factors may be more cost effective than supply-side subsidies and regulation."[184] Thus, "policies that focus on these demand-side factors perhaps offer more 'bang for the buck' in terms of increasing broadband penetration than supply-side policies such as subsidies for networks or regulation of providers."[185]

One such approach that relies on demand-side stimulus is the use of connectivity vouchers. Under this approach, Congress could provide qualifying households with vouchers to purchase broadband service, similar to the FCC's Emergency Broadband Benefit Program (EBB) for temporary vouchers during the pandemic.[186] With such an approach, consumers would be able to both get and stay connected and to exercise judgment about what type of connectivity best suits their needs.[187] This approach depends on incentives coming from consumer choice itself rather than government mandate—i.e., consumers would be able to choose among wireless, satellite, WISP, cable, or other available options instead of having regulators essentially choose for them through speed and facility requirements.

Indeed, the FCC has longstanding voucher programs intended to facilitate greater connectivity, including the Connect America Fund, Lifeline, and the Universal Service Fund.[188] These programs need reform,[189] surely, but they demonstrate the basic model to connect more consumers.

Among the challenges inherent in voucher subsidy programs are setting the appropriate levels of subsidy and determining eligibility requirements. Subsidies that currently go to providers to build out in certain areas would need to be targeted to residents in those areas. Lawmakers would have to decide whether everyone in a targeted area would receive the voucher, or just those below certain

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[183] *See also* George S. Ford, Thomas M. Koutsky & Lawrence J. Spiwak, *The Demographic and Economic Drivers of Broadband Adoption in the United States*, Phoenix Center Policy Paper No. 31 (2007) at 19, *available at* http://www.phoenix-center.org/pcpp/PCPP31Final.pdf ("Our analysis therefore indicates that demographic and economic endowments, and not necessarily specific regulatory policies directed at broadband providers or subsidizing broadband networks, are the most important drivers of broadband adoption.").

[184] *Id.* at 5.

[185] *Id.* at 20.

[186] *See* FCC, *In the Matter of the Emergency Broadband Benefit Program*, *supra* note 176. *See also* Mignon Clyburn & Robert McDowell, *Congress Can Help America Stay Connected During the COVID Crisis*, MORNING CONSULT (May 15, 2020), https://morningconsult.com/opinions/congress-can-help-america-stay-connected-during- the-covid-crisis/.

[187] *See* Skorup & Kotrous, *supra* note 70, at 6-7.

[188] *See* FCC, *Universal Service* (last updated May 11, 2021), https://www.fcc.gov/general/universal-service.

[189] *See* Daniel Lyons, *Narrowing the Digital Divide: A Better Broadband Universal Service Program*, 52 U.C. DAVIS L. REV. 803 (2019).

income thresholds. Determinations would also have to be made regarding what level of subsidy would be sufficient to increase incentives for buildout and adoption. Setting the voucher value too low could risk failing to incentivize buildout; setting the value too high could make service more expensive without significantly increasing consumer welfare.[190]

Despite these challenges, subsidies are economically superior to government-run networks as a means to stimulate broadband adoption beyond the natural market level.[191] Subsidies can be recouped through taxation if necessary, and they can be as general or specific as necessary (targeted just at underserved customers or treated as a broad-spectrum incentive to providers). Moreover, they can be adjusted as market conditions change—if a new service meets consumer demand at market rates, the subsidy can be withdrawn.

Building on the EBB, a modernized Lifeline program, for example, could be reimagined as a general stipend to purchase telecommunications and Internet services. Lifeline currently imposes numerous regulatory hurdles that make it costly to administer. Remodeling the program to be more like the U.S. Department of Agriculture's Supplemental Nutrition Assistance Program would better empower consumers, as well as stimulate the demand needed to induce ISPs to invest in new buildout and upgrades in areas where they are most needed.

D. Be sensible about municipal broadband

The Broadband for America's Future Report, as well as proposals from other organizations, dramatically overweight the presumed value of municipal broadband.[192] As discussed above, standing up a municipal broadband provider in a community with *zero* existing providers could potentially benefit its users by redistributing costs through the local tax system in ways that may not be easily replicable by a private provider. But this is not the typical situation (nor even the typical case in the tail of broadband distribution).[193] Rather, the central problem of municipal broadband is that it is often

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[190] *See* Goolsbee, *Subsidies, the Value of Broadband, and the Importance of Fixed Costs*, *supra* note 173, at 292-93 ("The analysis of policies to subsidize broadband adoption indicates that subsidizing usage generates more adoption than does subsidizing fixed costs, but consumer welfare gains are much smaller—about half—and revenue costs are much higher. By definition, usage subsidies would attract marginal customers, who do not highly value the product, and also subsidize those who would become customers irrespective of such subsidies. They tend to cost significantly more than they generate in consumer surplus.").

[191] *See* Beard, Ford, Spiwak & Stern, *supra* note 118, at 55-57.

[192] *See, e.g.*, Claire Park, *Community Broadband: The Fast, Affordable Internet Option That's Flying Under the Radar*, Open Technology Institute Report (May 20, 2020), https://www.newamerica.org/oti/reports/community-broadband/; H. Trostle, Katie Kienbaum, Michell Andrews, Ny Ony Razafindrabe & Christopher Mitchell, *Cooperatives Fiberize Rural America: A Trusted Model For The Internet Era*, Institute for Local Self-Reliance Community Networks Policy Brief (May 2020), *available at* https://ilsr.org/wp-content/uploads/2020/05/2020_05_19_Rural-Co-op-Report.pdf.

[193] *See* Beard, Ford, Spiwak & Stern, *supra* note 118, at 32 ("In almost all cases, adding the first firm to the market produces much of the welfare available from the product. In communities without broadband service, getting that first provider into the market is exceedingly crucial, especially in light of the view that broadband is privately and socially valuable. Getting that

deployed where existing service already exists or where redistribution and subsidization are politically expedient, rather than socially optimal.

If the municipal provider focuses on the costly local backbone by laying conduit and wiring anchor institutions, subsequent public-private partnerships could emerge that allow the municipality to manage a much more limited portion of the network. Meanwhile, private providers could assume responsibility to deploy and maintain last-mile connections, as well as provide the often-burdensome customer-service functions.

Where a municipal provider intends to provide service directly to customers, it should focus on a basic tier. The long-term goal should be to encourage private providers with expertise in broadband investment and management to enter the community and more efficiently and effectively serve customers.[194] Relatedly, where municipal broadband is encouraged, it is crucial to ensure that service provision does not exacerbate the digital divide by curtailing private investment in exurban and rural areas outside the municipal service area, thereby creating a broadband "donut hole" problem.[195]

E. Remove existing regulatory barriers

Perhaps the lowest-hanging fruit to facilitate the optimal deployment and adoption of broadband is the *removal* of existing policies that needlessly impede the construction and efficient operation of broadband services. Local, state, and federal governments should remove taxes and regulations that deter investment, and reform rules and regulations that otherwise make it difficult for providers to build new facilities (e.g., pole attachment rules, rights-of-way rules, and franchising restrictions).[196]

Indeed, the Broadband for America's Future Report endorses exactly this as one option available to local governments to help facilitate broadband deployment and adoption.[197] In some respects, the

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first firm in the market is valuable, but costly. Subsidizing a network in an unserved market should be subject to a cost-benefit analysis."). *See also* Nuechterlein & Shelanski, *supra* note 37, at 256 ("[A municipal broadband network] can offer invaluable consumer benefits in many circumstances—for example, where it is the only broadband ISP in a market, or where it does not materially rely on taxpayer dollars or other exogenous sources of revenue (such as monopoly electric utility fees) to fund its operations.").

[194] According to one analysis, it costs municipalities an additional *$15 million* to install a broadband network. *See* Wilson, *supra*, note 157 at 38("I find that it costs public providers an additional $15.6 million to install a municipal network. Public providers typically only operate within the geographic boundaries of their municipality. Therefore, they are unable to take advantage of economies of scale as private firms do, such as in customer service, billing, and marketing. Further, private firms that operate on a larger scale likely face lower costs through learning by doing; public firms that only enter a single market do not have this opportunity. But, most of all, the additional costs faced by public entities likely represent the substantial burden of convincing constituents to undertake such an endeavor, as well as other political, legal, and administrative costs. These barriers are reflected in the extraordinarily high costs I estimate, which in turn rationalize municipalities' low rate of entry.").

[195] *See supra* Section III.B.

[196] *See, e.g.*, Stout & Adams, *supra* note 75.

[197] Broadband for America's Future Report, *supra* note 7, at 52 ("One approach involves local governments adopting and executing policies to encourage private-sector deployment by reducing the costs incurred by broadband network providers.")

report's suggestions may be an easier lift than tax breaks or regulatory repeals. For instance, it suggests that "localities can provide easier access to infrastructure information. Local building codes can adopt more connection-friendly standards, particularly for apartment buildings, condominiums, and cooperatives and in large, planned developments. The ability to access existing poles and similar infrastructure is also important for new entrants."[198] Similarly, the report suggests regulatory reforms such as "speeding and easing the process for approval of construction permits and providing accurate, easy-to-use infrastructure maps," along with a streamlined approval process for providers to follow.[199] This is all reinforced, moreover, by municipalities employing "dig once" requirements, which would limit the costs to providers of constructing new networks, as well as limiting societal disruption.[200] These are all good ideas that offer potentially significant benefits at virtually no direct cost.[201]

Needless to say, regulatory drags on investment are legion and go beyond merely the obvious red tape. For instance, the FCC recently forbade a longstanding practice of municipalities using fees, assessments, and franchise obligations in order to extract revenue in excess of statutory limitations on broadband taxes.[202]

Wireless providers have experienced similar problems with municipalities. As the FCC noted in its Wireless Infrastructure Order in 2018, municipal requirements to deploy 5G small cells had become untethered from the actual costs of management and maintenance and were instead used by localities as revenue-generating programs.[203] The FCC curtailed these in its Order by permitting fees only to the extent they are nondiscriminatory and represent a reasonable approximation of the locality's reasonable costs.[204] The Commission also adopted "shot clocks" that require municipalities to take

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[198] *Id.* at 51.

[199] *Id.* at 52.

[200] *Id.* at 53. *See also Hearing on Promoting Broadband Infrastructure Investment, House Subcomm.on Comm'cns and Tech*, Testimony of Michael Slinger, Director of Google Fiber City Teams, Google Inc. (July 22, 2015), https://docs.house.gov/meetings/IF/IF16/20150722/103745/hhrG-114-IF16-wstate-SlingerM-20150722.pdf. ("In the context of the U.S. federal highway system, the U.S. GAO points out that 'dig once' policies can save up to 25–33% in construction costs in urban areas and roughly 16% in rural areas. Not only is this an attractive option to providers who save the time and expense of digging, but it has the added benefit of reducing future disruption for local citizens (who probably don't want to deal with a future road closure if it can be avoided).").

[201] The *political* costs of overcoming the opposition of entrenched political beneficiaries who profit from the current rules at the expense of the broader public is another matter, of course.

[202] *See* FCC, *In the Matter of Implementation of Section 621(a)(1) of the Cable Communications Policy Act of 1984 as Amended by the Cable Television Consumer Protection and Competition Act of 1992*, MB Docket No. 05-311 (Aug. 1, 2019), *available at* https://docs.fcc.gov/public/attachments/FCC-19-80A1.pdf.

[203] *See* FCC, *Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Investment; Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Investment, Declaratory Ruling and Third Report and Order*, 33 FCC Rcd. 9088, ¶ 69 (Sep. 27, 2018).

[204] *Id.* at ¶¶ 71-80 (interpreting 253(c) to limit compensation to reasonable and nondiscriminatory rates that are competitively neutral).

timely action on applications for deployment or collocation of wireless facilities.[205] Any public policy that takes deployment seriously should begin by addressing similar extractive rules that, especially when experienced in concert, erect significant and needless roadblocks to broadband infrastructure deployment.

Other barriers to effective deployment emerge from the Universal Service Fund (USF) mechanism, a fee on telephone service that has been used to support buildout of both telephone and Internet service, but that today stands as an ineffective anachronism from a bygone era of analog telephony. Among its myriad problems is that there simply is not enough revenue left in traditional telephone service to finance the capital costs needed to close the digital divide. Closing the digital divide requires modernizing not only our infrastructure but also the funding mechanisms that support it. Congress should instead fund any significant investment through general revenue.

Relatedly, Eligible Telecommunications Carrier (ETC)[206] requirements should be eliminated. Broadband subsidy programs for "high-cost" rural deployment currently require recipients to obtain ETC status from a relevant state regulator, which imposes exorbitant and unnecessary costs that may deter some potential providers from even seeking USF funds.[207] Last year's Expanding Opportunities for Broadband Deployment Act[208]—sponsored in the 117th Congress by Rep. G.K. Butterfield (D-N.C.)—would have eliminated this requirement, and any broadband infrastructure programs should do likewise. The need for so-called "providers of last resort" is another anachronism of the analog telephone age. The FCC is perfectly capable of providing necessary oversight.[209] The benefit for rural consumers would be the timelier arrival of service-improving competition in their areas. This would work in harmony with streamlined user-subsidy programs to make it easier for more telecommunications providers to reach subsidized consumers.

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[205] *Id.* at Appendix A (amending § 1.6003 to require a reasonable period of time to act on siting applications).

[206] *See* 47 CFR § 54.201.

[207] *See* Michael O'Rielly, *Removing Unnecessary Barriers and Maximizing Competition in USF Auctions*, FCC BLOG (Jun. 18, 2020), https://www.fcc.gov/news-events/blog/2020/06/18/removing-unnecessary-barriers-and-maximizing-competition-usf-auctions.

[208] Expanding Opportunities for Broadband Deployment Act, H.R. 3376, 117th Cong. § 1 (2021), https://www.congress.gov/bill/117th-congress/house-bill/3376.

[209] *See* O'Rielly, *supra* note 203 ("[T]he Commission already imposes its own legal, technical, and financial requirements on auction winners, not to mention extensive rules for interconnected VoIP providers outside of the auction context on everything from rural call completion to 9-1-1 obligations, and ETC status doesn't seem to confer any additional necessary protections. Moreover, as we know from [the Connect America Fund Phase II], ETC status certainly isn't a guarantee of providers' ability to meet service milestones. Finally, most ironically, many states have run their own efficient and effective broadband funding programs without requiring recipients to become ETCs, increasing participation without any problematic consequences.").