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Internet Policy's Next Frontier: Data Caps, Tiered Service Plans, and Usage-Based Broadband Pricing

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I. INTRODUCTION

The United States is in the midst of an explosion in Internet content and applications. In 2012 alone, Internet traffic in the United States grew thirty-six percent over the previous year, reaching a volume sixteen times greater than the entire U.S. Internet in 2005.[1] Peak-time traffic grew even faster,[2] driven by the rising popularity of bandwidth-intensive real-time entertainment such as Netflix, which by itself generates nearly one-third of all downstream traffic during peak hours.[3] And that growth will continue for the foreseeable future: network equipment giant Cisco Systems expects U.S. Internet traffic nearly to triple between now and 2017.[4] Globally, more data will traverse the network in 2017 than in every year from 1984 through 2012 *combined*.[5]

This steady growth in demand, and the continuing capital investment required to meet it, has prompted broadband providers to reconsider the flat-rate pricing model that has dominated the consumer Internet access market since the late 1990s. Flat-rate, or all-you-can-eat pricing, has proven popular with consumers, primarily because such plans are simple and predictable. Customers know how much they will pay for broadband access each month, and can use the Internet without worrying that excessive use will eat into the family budget. But flat-rate unlimited use can also create

1. *VNI Forecast Highlights*, CISCO SYS., http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html (last visited Aug. 10, 2013) (click "Filter by Country", click the United States, and click "2012 Year in Review") ("In the United States, average Internet traffic grew 36% in 2012. . . . Internet traffic was 240 Petabytes per day in 2012, up from 179 Petabytes per day in 2011. . . . U.S. Internet traffic in 2012 was equivalent to 16x the volume of the entire U.S. Internet in 2005.").

2. *Id.* (same instructions) ("In the United States, peak Internet traffic grew 41% in 2012.").

3. SANDVINE, GLOBAL INTERNET PHENOMENA REPORT 2H 2012 6 (2012) [hereinafter Sandvine 2012]. Sandvine defines peak time as the period within which aggregate network traffic is within five percent of its highest daily value. *Id.* at 29. On an average day, the peak time for downstream Internet traffic in North American fixed networks is roughly from 9:00 until 11:30 p.m. SANDVINE, GLOBAL INTERNET PHENOMENA REPORT FALL 2011 5 (2011) [hereinafter Sandvine 2011]. Sandvine estimates that peak times are becoming shorter but more intense, as "subscribers are concentrating the same amount of activity within an increasingly narrow slice of time." *Id.* As discussed below, peak times on wireless networks are more varied and unpredictable.

4. *See VNI Forecast Highlights*, *supra* note 1 (click "Filter by Country", click the United States, and click "2017 Forecast Highlights") ("In the United States, Internet traffic will grow 3.2-fold from 2012 to 2017 . . . . Internet traffic will be 783 Petabytes per day in 2017, up from 240 Petabytes per day in 2012. . . . [P]eak Internet traffic will grow 3.6-fold.").

5. *See id.* ("Globally, IP traffic will reach an annual run rate of 1.4 Zettabytes in 2017."); ROBERT PEPPER, MOBILE NETWORKS IN A ZETTABYTE WORLD: TRENDS FROM CISCO'S VISUAL NETWORKING INDEX 3 (2012) ("By 2016, global IP traffic will reach an annual run rate of 1.3 zettabytes per year[.] . . . [M]ore traffic will traverse global networks than from the beginning of the Internet to today . . . combined. 1984-2012: 1.2 Zettabytes"), *available at* http://www.gsma.com/spectrum/wp-content/uploads/2012/06/Dr_Robert-_Pepper_Cisco_Public_Policy-Forum_Data_Demand.pdf.

inefficient network operation. Because price is not tied to online use, consumers have little incentive to economize their bandwidth consumption. Moreover, network costs are spread evenly throughout the customer base, forcing light Internet users to subsidize heavier users' data-intensive lifestyles.

Broadband providers have begun experimenting with alternative pricing strategies to address these inefficiencies. This movement is most visible in the wireless industry, where the smartphone revolution grew much faster than providers expected. Smartphone use, in turn, spawned a new industry in mobile content and applications and at times has caused wireless broadband demand to outstrip network capacity (a phenomenon sometimes called the "iPhone effect").[6] Tiered pricing has now become the norm in wireless broadband, where consumers face a wide range of pricing and service options.[7] Many residential fixed broadband providers have also explored tiered service, monthly data caps, and overage charges.

While regulators[8] and many academics[9] have largely supported this shift, many public interest groups have reacted with skepticism.[10] Groups such as Public Knowledge and Free Press, both of which helped drive the net neutrality movement, have argued that broadband providers should

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6. Crystal Lyons, *Data Caps—Opportunities and Concerns for Developers*, BOSTINNO (July 2, 2012, 9:39 AM), http://bostinno.com/channels/data-caps-opportunities-and-concerns-for-developers/; David Goldman, *AT&T Isn't Nearly As Bad As You Think*, CNNMONEY (July 8, 2013, 6:08 AM), http://money.cnn.com/2013/07/08/technology/mobile/att-4g-network/index.html (describing the iPhone effect on AT&T's 3G network).

7. *See, e.g.*, Rene Ritchie, *AT&T Adds Data Caps, Changes Rates for iPhone Plans, Will Support Tethering for Extra Charge*, IMORE (June 2, 2010, 7:48 AM), http://www.imore.com/2010/06/02/att-adds-data-caps-rates-iphone-plans-plans-support-tethering/.

8. *FCC Boss Backs Usage-Based Pricing for Cable Internet Access*, NBCNEWS (May 22, 2012, 4:14 PM) http://www.nbcnews.com/business/fcc-boss-backs-usage-based-pricing-cable-internet-access-788008?franchiseSlug=businessmain; Michael Turk, *Public Policy Discussion With FTC and FCC Commissioners*, CABLETECHTALK (June 15, 2011) http://www.cabletechtalk.com/the-cable-show/public-policy-discussion-with-ftc-and-fcc-commissioners/; *but see* Karl Bode, *FCC Boss Suddenly 'Concerned' About Bandwidth Caps?*, DSLREPORTS.COM (Sept. 12, 2012), http://www.dslreports.com/shownews/FCC-Boss-Suddenly-Concerned-About-Bandwidth-Caps-121154 (Former Chairman Genachowski recently questioned the propriety of data caps).

9. *Hearing on Net Neutrality Before the S. Comm. on Commerce, Science, and Transportation*, 109th Cong. 2 (2006) (statement of Prof. Lawrence Lessig) ("I believe, for example, that consumer-tiering should be encouraged."); Cecilia Kang, *Comcast Illegally Interfered with Web File-Sharing Traffic, FCC Says*, WASH. POST (July 30, 2008), http://www.washingtonpost.com/wp-dyn/content/article/2008/07/29/AR2008072902077.html (last visited July 23, 2013) (quoting Prof. Timothy Wu, who describes usage-based pricing as "probably the fairest system going").

10. *See, e.g.*, ANDREW ODLYZKO ET AL., KNOW YOUR LIMITS: CONSIDERING THE ROLE OF DATA CAPS AND USAGE BASED BILLING IN INTERNET ACCESS SERVICE 47 (2012); Letter from Free Press, Consumers Union, Public Knowledge, and New America Foundation to Sen. John D. Rockefeller and Sen. Kay Bailey Hutchison (Apr. 23, 2012) [hereinafter Letter from Free Press], *available at* http://www.freepress.net/sites/default/files/fp-legacy/PI_letter_Senate_Commerce_OVDtrends_Apr2012_FINAL.pdf.

charge customers the same amount regardless of use.[11] They fear that monthly consumption limits create artificial scarcity, allowing providers to pad profits and avoid future network upgrades. They also assert that fixed broadband providers may use monthly limits to shield their cable businesses from Internet-based competitors.[12] These arguments have found an audience at the Justice Department, which is investigating whether data caps violate antitrust law.[13] In late 2012, Senator Ron Wyden introduced a bill that would regulate and limit the practice.[14]

This article explores the trend toward usage-based broadband pricing. It finds that data caps and other forms of metered consumption are not inherently anti-consumer or anticompetitive. Rather, they reflect different pricing strategies through which a broadband company may recover its costs from its customer base and fund future infrastructure investment. By aligning costs more closely with use, usage-based pricing shifts more network costs onto those consumers who use the network the most. Companies can thus avoid forcing light Internet users to subsidize the data-heavy habits of online gamers and movie torrenters. Usage-based pricing may also help alleviate network congestion by encouraging customers, content providers, and network operators to use broadband more efficiently.

As opponents of usage-based pricing have noted, data caps may be deployed for anticompetitive purposes. But regulators should be concerned primarily when a firm with market power exploits that power in a way that harms consumers.[15] Absent a specific market failure, which critics have not yet shown, broadband providers should be free to experiment with usage-based pricing and other pricing strategies, using these as tools in their arsenal to meet rising broadband demand. Public policies allowing providers the freedom to experiment best preserve the spirit of innovation that has characterized the Internet since its inception.

This article critically examines the policies underlying this shift toward usage-based pricing. Part I describes usage-based pricing generally

11. ODLYZKO ET AL., *supra* note 10, at 54.

12. *See id.* at 56. As discussed in greater detail below, this concern was brought into sharp focus when Comcast announced that customers who subscribe to both broadband and the company's Xfinity cable service would be permitted to watch Xfinity using an app on the Microsoft Xbox without incurring charges against the customer's data cap, even though Netflix and other Internet-based video streamed through the Xbox would be counted against the customer's cap. *See* App'ns of Comcast Corp., Gen. Electric Co., & NBC Universal, Inc. for Consent to Assign Licenses and Transfer Control of Licenses, *Petition to Enforce Merger Conditions*, FCC MB Docket No. 10-56 (fil. Aug. 1, 2012) [hereinafter *Petition to Enforce Merger Conditions*].

13. Cecilia Kang, *Justice Dept. Probing Cable Companies' Internet Data Limits*, WASH. POST (June 13, 2012), http://articles.washingtonpost.com/2012-06-13/business/35460748_1_cable-companies-internet-data-antitrust.

14. Data Cap Integrity Act, 112 Cong. (2012), *available at* http://www.wyden.senate.gov/download/data-cap-integrity-act-bill-text.

15. Market power is the ability for a corporation to raise its prices above the competitive level by reducing output. *See* PAUL KRUGMAN & ROBIN WELLS, MICROECONOMICS 358 (2008).

and details its rise in both wireless and fixed broadband service. Part II analyzes usage-based pricing as a cost recovery tool, a way that a broadband provider can allocate its fixed costs across its customer base. Part III considers the pricing strategy as a method of managing broadband network congestion. Part IV examines the potential anticompetitive uses of a usage-based pricing strategy. Finally, Part V highlights the need for transparent policies and consumer education to facilitate the shift toward usage-based pricing, and offers policy recommendations to protect consumers.

II. THE SHIFT TO USAGE-BASED PRICING IN BROADBAND MARKETS

A. *A Taxonomy of Usage-Based Pricing*

"Usage-based pricing" is an umbrella term for any billing system that charges on the basis of consumption. Although Internet access providers abandoned usage-based pricing for consumers early in the industry's history,[16] it is common in other parts of the Internet ecosystem and in many other network industries.[17] In its simplest form, known as "metering," the firm charges a basic fee per unit consumed. For example, telephone companies such as AT&T and Sprint historically charged a certain rate per minute for long-distance calls. The price per minute became a high-profile point of competition between carriers.[18]

In more sophisticated variations, companies can use metered pricing to induce particular customer behavior. Many companies offer a per-unit discount on large purchases, to encourage higher-volume consumption. Alternatively, some utilities such as water companies charge a higher rate

16. During the early 1990s, dial-up Internet providers typically offered Internet access at a per-minute rate. This changed in 1996, when industry leader America Online changed to a flat-rate, unlimited use pricing model. The company was initially unprepared for the increased demand generated by the shift, which led to numerous blackouts and busy signals. *See* Matthew T. Bodie, *AOL Time Warner and the False God of Shareholder Primacy*, 31 J. CORP. L. 975, 986 (2006) (citing NINA MUNK, FOOLS RUSH IN: STEVE CASE, JERRY LEVIN, AND THE UNMAKING OF AOL TIME WARNER 84 (2004)). But the move nonetheless proved popular with consumers, leading competitors to follow suit. As dial-up yielded to higher-capacity broadband networks, competitors retained the unlimited flat-fee model.

17. Network industries are those in which consumers attach themselves to one or more networks, for example, communications and transportation networks, such as telephone, computer, railroad, or electricity networks. Networks tend to exhibit positive feedback due to demand-side scale economies: large networks are more attractive to buyers, and thus tend to get larger. *See* Carl Shapiro, Deputy Assistant Attorney Gen., Antitrust Div., Dep't of Justice, Speech before the American Law Institute and American Bar Association: Antitrust in Network Industries (Jan. 25, 1996), *available at* http://www.justice.gov/atr/public/speeches/0593.pdf.

18. *See, e.g.*, Edward Cavanaugh, *Antitrust Remedies Revisited*, 87 OR. L. REV. 147, 198 (2005) (discussing long-distance competition in the wake of the 1984 breakup of the AT&T monopoly).

per unit after consumption reaches a certain threshold, to encourage conservation and penalize customers who draw more than their neighbors from a common pool.[19] Some electricity utilities, facing above-capacity demand during peak times, charge a different rate per kilowatt-hour for peak and non-peak electricity use, hoping to induce customers to shift nonessential consumption.[20] Similarly, wireless companies famously offered free nights and weekends to customers, partly to shift call volumes to periods when the telephone network was underutilized.[21]

Companies may also adopt a *two-part tariff*, wherein the customer pays a fixed rate per month for access to the network and an additional fee per unit for consumption on that network. Two-part tariffs are attractive to network industries because the fixed fee ensures that all customers contribute in some measure toward common network costs, while the per-unit fee recovers marginal costs efficiently, and can also shift some network costs onto heavier users. Tiered pricing is one form of a two-part tariff that is common in the wireless telephone industry. Under tiered pricing, customers could choose among wireless plans, each of which offers a certain number of minutes per month at a fixed rate.[22] Each customer receives unrestricted calling each month up to his or her plan limit, and then incurs an additional per-minute charge for consumption exceeding that threshold.[23]

B. Usage-Based Pricing for Fixed Broadband Service

Although residential consumers are accustomed to flat-rate unlimited Internet access, it is important to note that usage-based pricing has long been the norm in many other parts of the Internet ecosystem. Content providers often get online by purchasing Internet transit service from a transit provider.[24] Transit providers act as gateways allowing content providers to route their data to the Internet. Smaller transit providers also often purchase transit service from larger networks.[25] Transit is typically sold on a metered basis: customers pay based upon the volume of traffic they send each month.[26] Many customers pre-commit to certain volumes

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19. *See* SCOTT WALLSTEN, PROGRESS & FREEDOM FOUND. PROGRESS SNAPSHOT, MANAGING THE NETWORK? RETHINK PRICES, NOT NET NEUTRALITY 3 (Release 3.12, Oct. 2007).

20. *See e.g.*, *On Peak & Off Peak Hours*, PACIFIC POWER, http://www.pacificpower.net/ya/po/otou/ooh.html (last visited Aug. 10, 2013).

21. *See* Jerry Ellig, *Intercarrier Compensation and Consumer Welfare*, 2005 U. ILL. J.L. TECH. & POL'Y 97, 105 (2005); Christopher S. Yoo, *Network Neutrality, Consumers, and Innovation*, 2008 U. CHI. LEGAL F. 179, 206-07 (2008).

22. *See* Ellig, *supra* note 21, at 104-06.

23. *Id.*

24. See CHRISTOPHER S. YOO, THE DYNAMIC INTERNET 94 (2012); WILLIAM B. NORTON, THE INTERNET PEERING PLAYBOOK 28 (2013).

25. NORTON, *supra* note 24, at 28.

26. Importantly, transit rates typically do not reflect a customer's total monthly bandwidth usage, but rather the customer's peak bandwidth usage. See YOO, *supra* note 24, at 94;

each month at a "committed rate", and pay an incremental rate-per-unit for traffic above the committed rate.[27] To avoid transit fees and to route content more quickly to its destination, some content providers choose instead to purchase access from private content-delivery networks such as Akamai or Limelight, which also typically charge customers based on volume.[28]

Many fixed broadband providers are moving toward usage-based pricing for residential consumers as well. More specifically, several have adopted data caps, which can function as a two-part tariff. A consumer typically purchases a fixed number of gigabytes that he or she may consume monthly, often followed by some penalty if the consumer exceeds the cap. Comcast adopted a 250-gigabyte monthly cap on residential broadband customers in 2008.[29] The company contacted customers who

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NORTON, *supra* note 24, at 31-32. The transit provider maintains a meter that records the traffic the customer sends for transit. Every five minutes, the meter is sampled, and the transit provider records the total traffic since the last five-minute interval. A the end of the month, each five-minute interval is converted into megabits-per-second, and rank-ordered from lowest to highest. The megabits-per-second at the 95th percentile is used to determine the customer's bill for the month, so that the customer is not penalized for occasional, unusually large traffic bursts. The transit provider multiplies the 95th-percentile megabit-per-second rate by the contractual price per megabit/second to calculate the customer's monthly bill. NORTON, *supra* note 24, at 30-32.

27 NORTON, *supra* note 24, at 32-33.

28 *Id*. at 149; see, e.g., Dan Rayburn, Video CDN Data: Pricing, Contract, Volume, and Market Sizing Trends, May 14, 2012, available at http://blog.streamingmedia.com/wp-content/uploads/2012/09/2012CDNSummit-Rayburn-Pricing.pdf (last visited August 14, 2013) (showing that CDN customers typically pay on a per-GB-delivered or per-Mbps-sustained basis).

29. *See Announcement Regarding an Amendment to Our Acceptable Use Policy*, COMCAST CORP., http://xfinity.comcast.net/terms/network/amendment/ (last visited Aug. 10, 2013) [hereinafter *Comcast Acceptable Use*]. The policy took effect on October 1, 2008. This change came shortly after the FCC sanctioned the company for secretly degrading peer-to-peer networking traffic as a method of managing network congestion. *See* Formal Complaint of Free Press & Public Knowledge Against Comcast Corp. for Secretly Degrading Peer-to-Peer Applications, *Memorandum Opinion and Order*, 23 FCC Rcd. 13028, 13066 (2008) [hereinafter *Formal Complaint of Free Press*], *vacated*, Comcast Corp. v. FCC, 600 F.3d 642 (D.C. Cir. 2010). As a result, many commenters have suggested Comcast adopted its data cap to solve the congestion problems caused by peer-to-peer traffic, although Comcast did not explicitly make this connection.

exceeded the cap[30] and reserved the right to terminate service to repeat offenders, though it is unclear how often it actually did so.[31]

Shortly thereafter, Time Warner Cable experimented with a much lower data cap and an overage charge in some markets, but canceled the pilot program after negative customer feedback.[32] AT&T and CenturyLink have also adopted data caps,[33] although Verizon has not. In May 2012, Comcast eliminated its 250-gigabyte cap and since then has begun testing other pricing models in some markets, including a soft cap of 300 gigabytes with a per-gigabyte overage charge for exceeding the cap.[34]

Of course, the effectiveness of a data cap depends significantly on customers' understanding of how much data their online activities consume, and how close they come to the cap each month. A recent Sandvine report on network use states that the mean monthly data

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30. *Comcast Acceptable Use*, *supra* note 29 ("The only difference is that we will now provide a limit by which a customer may be contacted. As part of our pre-existing policy, we will continue to contact the top users of our high-speed Internet service and ask them to curb their usage. If a customer uses more than 250 GB and is one of the top users of our service, he or she may be contacted by Comcast to notify them of excessive use."); *How Comcast Reads Your Data Usage*, COMCAST CORP., http://customer.comcast.com/help-and-support/internet/data-usage/ (last updated Aug. 8, 2013) ("If you exceed 250 GB again within six months of the first contact, your service will be subject to termination and you will not be eligible for either residential or commercial Internet service for twelve months.").

31. Public Knowledge, a public interest group that has challenged data caps, has profiled Andre Vrignaud, a gaming consultant whose access was terminated after he exceeded the cap for two consecutive months in 2011. *See* ODLYZKO ET AL., *supra* note 10, at 3-4. Vrignaud claimed his excessive use stemmed from his reliance on cloud-based storage. *Id.*; *see also* Ryan Singel, *Comcast Bans Seattle Man from Internet for his Cloudy Ways*, WIRED (July 13, 2011, 4:20 PM), http://www.wired.com/epicenter/2011/07/seattle-comcast/ (last visited July 25, 2013). After Vrignaud's story received national attention, Comcast offered to restore his service, though he apparently declined the offer. *See* Dean Takahashi, *Who Will Pick Up Paying Customer That Comcast Dropped Because of High Data Usage?*, VENTUREBEAT (July 29, 2011, 2:00 PM), http://venturebeat.com/2011/07/29/who-will-pick-up-paying-customer-that-comcast-dropped-because-of-high-data-usage/ (last visited Aug. 2, 2013).

32. In Beaumont, Texas, customers were offered a choice of 5, 10, 20, or 40 gigabytes monthly, with a fee for exceeding the cap. *See* Chloe Albanesius, *Time Warner to Test Usage-Based System*, PC MAGAZINE (Jan. 17, 2008, 5:39 PM), http://www.pcmag.com/article2/0,2817,2250259,00.asp (last visited July 25, 2013). The company later marketed 100 gigabyte caps in New York and North Carolina. *See* Chloe Albanesius, *Time Warner Scraps Bandwidth Cap Testing*, PC MAGAZINE (April 16, 2009, 3:35 PM), http://www.pcmag.com/article2/ 0,2817,2345430,00.asp (last visited July 25, 2013).

33. *See* Jared Newman, *AT&T's U-Verse and DSL Data Caps: Good Deal, Bad Precedent*, PC WORLD (March 14, 2011, 8:43 AM), http://www.pcworld.com/article/222039/atandts_uverse_and_dsl_data_caps_good_deal_bad_precedent.html (last visited July 25, 2013); *Excessive Use Policy*, CENTURYLINK, http://qwest.centurylink.com/internethelp/eup.html (last visited Aug. 10, 2013).

34. *See Comcast Monthly Data Usage Threshold Suspension*, COMCAST CORP., http://customer.comcast.com/help-and-support/internet/common-questions-excessive-use/ (last updated July 23, 2013).

consumption in 2012 was 51.3 gigabytes.[35] Based on this figure, one could use almost six times more data than the average consumer before running afoul of Comcast's 300-gigabyte limit. According to Netflix, streaming video typically consumes between 0.3 and 1.0 gigabytes per hour, while its high-definition (HD) content streams at 2.3 gigabytes per hour.[36] To reach 300 gigabytes, one would need to stream 130 hours of HD content in one month—or approximately two feature-length movies each day. Alternatively, one could stream between 300 and 1000 hours of non-HD content. Comcast notes that its previous 250-gigabyte data cap permitted a customer to send approximately 50 million emails or download 62,500 songs each month.[37] While it is not inconceivable that a customer would reach these totals, they far exceed the amount of content a typical subscriber consumes each month. Comcast and other providers have created online tracking tools to help consumers measure their monthly usage and determine how much data individual activities consume.[38]

Other broadband providers have begun offering speed-based service tiers. Rather than paying for a fixed amount of gigabytes monthly, the customer chooses among different maximum download and upload rates.[39] For example, the basic Verizon FiOS broadband plan delivers customers 15 megabits per second (Mbps) download and 5 Mbps.[40] But customers can upgrade to premium plans offering between 50 and 500 Mbps download, and 25-100 Mbps upload.[41] Some broadband providers offer unlimited monthly data at various speeds, while others offer plans that vary both maximum speed and monthly data limits.[42]

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35. Sandvine 2012, *supra* note 3, at 6. While mean monthly data use is 51.3 gigabytes, median monthly data use is a much lower 16.8 gigabytes. *Id.* This implies that the mean is artificially inflated by heavier users and the median figure is more representative of the "average" household. *Id.* Nonetheless, to be cautious, this analysis uses the mean figure, particularly in light of the fact that per capita data consumption has likely increased since 2012. *Id.*

36. *Netflix Lowers Data Usage By 2/3 for Members in Canada*, NETFLIX (March 28, 2011, 7:00 PM), http://blog.netflix.com/2011/03/netflix-lowers-data-usage-by-23-for.html.

37. *Comcast Acceptable Use*, *supra* note 25.

38. *See Comcast Monthly Data Usage Threshold Suspension*, *supra* note 34.

39 See, e.g., Michael Weinberg, *Price Discrimination and Data Caps are Not the Same Thing*, ALLTHINGSD, Apr. 8, 2013, available at http://allthingsd.com/20130408/price-discrimination-and-data-caps-are-not-the-same-thing/ (last visited Aug. 14, 2013); Daniel A. Lyons, *We Should Promote Broadband Pricing Innovation*, COMPUTERWORLD, June 18, 2013, available at http://www.computerworld.com/s/article/9240126/We_should_promote_broadband_pricing_innovation (last visited Aug. 14, 2013).

40 http://www.verizon.com/home/fios-fastest-internet/fastest-internet-plans/ (last visited Aug. 14, 2013).

41 *Id*.

42 For example, in some markets Comcast offers several tiers of service at different speeds, but each tier is subject to a soft monthly data cap and an overage charge for exceeding the plan. See Teff Baumgartner, *Comcast, TWC Try on Data Caps*, MULTICHANNEL NEWS, Aug. 5, 2013, 2013 WLNR 19139706; Frequently Asked Questions

C. Usage-Based Pricing for Wireless Broadband Service

Like fixed broadband service, most wireless broadband providers initially offered flat-rate unlimited data plans. But the surprisingly strong surge in smartphone-driven mobile data demand prompted most wireless carriers to shift to data caps, primarily as a way to slow the growth rate of mobile broadband demand and allow network capacity to catch up.[43] In 2007, AT&T paid generously to be the exclusive carrier of Apple's iPhone, at a time when the smartphone was in its infancy. While the agreement succeeded in drawing more smartphone customers to AT&T, these customers were generally tech-savvy users with significant data demands.[44] By some reports, the average iPhone user consumed ten times the bandwidth of a typical smartphone user.[45] This concentration of heavy data users on the AT&T network led to much-publicized congestion in many urban areas, where smartphone users were concentrated. The company explained that forty percent of the network's traffic was driven by just three percent of its smartphone users, forcing the company to examine strategies either to reduce iPhone customer data use or to compensate the company for the congestion that they caused.[46] In December 2010, AT&T shifted to a three-tiered pricing plan, with limits at 200 megabytes, 2 gigabytes, and 4 gigabytes, with a per-gigabyte overage charge.[47] Verizon Wireless adopted similar caps the following year,[48] and in mid-2012 both companies added a shared-data option, which allows customers to share their monthly data multiple devices.

Other wireless carriers have embraced different methods of managing consumer data use. Like its competitors, T-Mobile also adopted

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About our Data Usage Plans, http://customer.comcast.com/help-and-support/internet/data-usage-what-are-the-different-plans-launching (last visited Aug. 15, 2013).

43. See, e.g., Andrew M. Seybold, *Wireless Network Congestion*, ANDREWSEYBOLD (Feb 9, 2012), andrewseybold.com/2845-wireless-network-congestion.

44. Brian X. Chen, *AT&T Chief Regrets Offering Unlimited Data for iPhone*, N.Y. TIMES (May 4, 2012, 4:25 PM), http://bits.blogs.nytimes.com/2012/05/04/att-randall-stephenson/.

45. Sam Oliver, *AT&T Caps New iPhone, iPad Data Plans at 2GB, Announces Tethering*, APPLE INSIDER (June 2, 2010, 8:05 AM), http://www.appleinsider.com/articles/10/06/02/att_announces_iphone_tethering_plans_caps_ipad_3g_data_at_2gb.html.

46. *Id.*

47. *Id.*

48. Trefis Team, *Verizon's Stock Looks Full at $42 As It Readies to Scrap Unlimited Data Plans*, FORBES (May 29, 2012, 10:58 AM), http://www.forbes.com/sites/greatspeculations/2012/05/29/verizons-stock-looks-full-at-42-as-it-readies-to-scrap-unlimited-data-plans/. Verizon's data caps came shortly after Apple made the iPhone available on Verizon's network. Both AT&T and Verizon initially grandfathered in the unlimited flat-rate data plans for existing customers, although both sometimes throttle back the speeds of the top five percent of data users still enrolled in these unlimited plans. Verizon Wireless has further announced that these grandfathered customers must surrender their unlimited data plans if they wish to migrate from 3G to the company's new LTE network, meaning many unlimited plans will be phased out over the next few years. *Id.*

a tiered pricing system for its customers in 2011.[49] T-Mobile, however, does not assess an overage charge on customers who exceed the cap.[50] Instead, those customers see their speed reduced to 100 kilobytes per second for the rest of the month.[51] Sprint offers unlimited data at a flat rate.[52] But speed tests often place the Sprint network a distant third behind AT&T and Verizon in most major areas, which suggests that these unlimited plans may take a toll on network operations.[53]

III. USAGE-BASED PRICING AS A COST RECOVERY TOOL

At their core, data caps and other forms of usage-based pricing represent different pricing strategies through which a company can spread its costs over its customer base. Usage-based pricing allows broadband companies to shift more of their network costs onto those who use the network the most. This alternative pricing strategy may prove both more efficient for network providers and more attractive to consumers, particularly those who cannot afford an unlimited flat-rate plan.

A. Distributional Effects of Flat-Rate and Metered Pricing

Under a flat-rate pricing system, lighter users end up paying a disproportionate share of overall network costs. As the Federal Communications Commission ("FCC") has noted, "[r]equiring all subscribers to pay the same amount for broadband service, regardless of the performance or usage of the service, would force lighter end users of the

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49. Jagdish Rebello, *Wireless Operators Prefer Tiered Pricing*, *Market Insight*, IHS ELECTRONICS & MEDIA (Aug. 12, 2011), http://www.isuppli.com/ mobile-and-wireless-communications/marketwatch/pages/wireless-operators-prefer-tiered-pricing.aspx. T-Mobile offers a premium tier with unlimited monthly data.

50. *See* Danny Sullivan, *In T-Mobile's 'Simple Choice' Plan, 'Unlimited' Meets Limits*, CNET (Mar. 26, 2013, 5:08 PM), http://news.cnet.com/8301-33620_3-57576454-278/in-t-mobiles-simple-choice-plan-unlimited-meets-limits/.

51. *See id.*

52. Sinead Carew, *Sprint 4G Network Upgrade May Kill Unlimited Data Plan*, HUFFINGTON POST (Nov. 26, 2011, 12:01 PM), http://www.huffingtonpost.com/ 2011/11/26/sprints-4g-network-unlimited-data-plan_n_1114084.html.

53. *See, e.g.*, David Goldman, *Which iPhone Carrier is Best in Your City?*, CNNMONEY (May 30, 2012), http://money.cnn.com/2012/05/30/technology/ iphone-carrier-compare/. PC Magazine notes that nationwide tests show Sprint's 3G network is "the slowest of the major wireless providers," with download speeds half of that on Verizon's 3G network. Sascha Segan & Alex Colon, *Exclusive: Testing Sprint's New 4G LTE Network*, PC MAGAZINE (June 18, 2012), http://www.pcmag.com/article2/0,2817,2405675,00.asp. The company is developing a 4G LTE network that will make the company more competitive. *Id.* The new network is projected to deliver maximum speeds slower than AT&T or Verizon, but is designed to manage traffic so as to deliver a consistent average speed during periods of high demand. *Id.*

network to subsidize heavier end users."[54] Heavier users consume more of the network's total capacity than lighter users, yet light and heavy users contribute equally to cover the network's costs. This means that lighter users pay a higher effective rate per megabyte than heavier users.

To put the Commission's concern another way, flat-rate pricing forces below-average users to purchase more broadband access than they use.[55] Typically, the network owner will set a price that reflects the bandwidth consumed by the average user.[56] This means that lighter users are charged as if they consume an average amount of data monthly, although by definition their actual usage is below that amount.[57]

This disparity could discourage broadband adoption, and limit access to broadband services, particularly among poorer consumers. If lighter users are forced to purchase more broadband than they need, some lighter users may choose not to purchase access at the single flat rate, even though the benefits they receive would exceed the cost of providing service at their anticipated volume level.[58] These consumers demand less from the Internet each month than the average user, and therefore may not place a high premium on unlimited access, though they may pay a lower rate for enough monthly data to meet their needs.

These effects would be unremarkable if most consumers used roughly the same amount of data. Cross-subsidization is a trivial issue if there is little absolute difference in data consumption between below-average and above-average users. In that instance, the amount of the subsidy would be small and might cancel out over time if individual users consume slightly below-average amounts of data in one month, and slightly above-average amounts in the next.

But this turns out not to be the case. According to Sandvine's Fall 2012 report on network traffic, the heaviest one percent of downstream users account for 12.8% of total North American fixed downstream traffic, while the heaviest one percent of upstream users account for almost thirty-nine percent of total upstream use.[59] By comparison, the bottom half of broadband consumers account for only 5.2% of total North American fixed broadband traffic.[60]

The gulf is vaster in the wireless market. Sandvine notes that median monthly mobile data consumption in North America is 32.9 megabytes.[61]

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54. Preserving the Open Internet Broadband Industry Practices, *Report & Order*, FCC 10-201, para. 72 (2010), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-10-201A1.pdf.

55. Yoo, *supra* note 21, at 203.

56. *See id.*

57. *Id.*

58. *See id.*

59. Sandvine 2012, *supra* note 3, at 7. "Downstream" refers to the flow of information from the Internet to the consumer, while "upstream" refers to the flow of information from the consumer to another destination on the Internet. *Id.*

60. *Id.*

61. *Id.* at 9.

But mean monthly consumption is almost ten times that figure, at 317.2 megabytes.[62] This means that a small number of heavy users are consuming significantly more data than the typical consumer.[63] This surprising result stems from the fact that the mobile data market is bimodal, consisting of a large number of first-generation feature phones and an increasing number of first-time smartphone adopters, both of which use small amounts of data, in addition to a customer segment using more data-intensive smartphones and tablets.[64] Therefore the mobile data network is dominated by a small, but increasing, number of heavy users. In fact, Sandvine estimates that the heaviest one percent of mobile data users consume 23.9% of upstream and 18.7% of downstream mobile traffic.[65] By comparison, the bottom half of all wireless data customers account for less than one percent of total network traffic.[66]

Given the substantial disparity between heavy and light users, it is not surprising that some broadband providers are exploring alternative pricing regimes that would eliminate the cross-subsidy. Former Commission Chairman Julius Genachowski noted that usage-based pricing can "increase choice and competition, and it can increase fairness. It can . . . result in lower prices for people who consume less broadband, so experimentation in this area with those goals in mind is particularly appropriate."[67] Former Federal Trade Commission Chairman Jon Leibowitz, an antitrust lawyer who specialized in telecommunications issues, similarly supports usage-based pricing, noting that the practice would help fund future investment in network expansion and upgrades.[68]

1. Simple Metered Pricing

There are several usage-based pricing models that could shift more network costs onto heavier users. A simple metered pricing plan, which bills the consumer on a per-megabyte or per-gigabyte basis, would ensure that the amount each consumer pays for broadband access reflects the use each customer receives from the network. Like water utilities, broadband providers could set a higher per-unit rate on data consumption above a

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62. *Id.*

63. The mean is the average amount of data consumed per customer, and is calculated by dividing total data consumption by total number of customers. The median is the amount of data consumed by the customer at the midpoint of the range, meaning if you ranked all customers from least data to most data, an equal number of customers use less than the median and more than the median. The significant disparity between the mean and the median stems from the fact that the customers who use above-median amounts of data consume *significantly* more data.

64. *See id.*; Sandvine 2011, *supra* note 3, at 10.

65. Sandvine 2012, *supra* note 3, at 10.

66. *Id.*

67. *Usage-Based Pricing Can Help Competition, Genachowski Says*, COMM. DAILY, 2012 WLNR 11103531 (May 23, 2012).

68. Jonathan Make, *Usage Based Billing Seen Being Introduced by U.S. Wireline ISPs*, COMM. DAILY, 2012 WLNR 12561386 (June 21, 2011).

certain amount to recover an even greater proportion of costs from those who draw most upon the common bandwidth pool.

But simple metered pricing might prove difficult to administer. First, the additional transaction costs of real-time tracking and billing at the customer-specific level may offset any revenue gains achieved by differential pricing.[69] Christopher Yoo posits that high transaction costs may explain why the local telephone market never moved to per-minute pricing despite a strong case that such pricing would be more efficient and fairer to consumers.[70] He suggests that similar dynamics could also undermine usage-based broadband pricing.[71] Brett Frischmann and Barbara van Schewick have responded that in the broadband market, these transaction costs are probably much lower than Yoo hypothesizes, given that most consumers access the Internet through a single network gateway.[72] They also note that many providers already offer an array of statistics on individual use by consumer.[73] This is particularly true in the wireless industry, where both provider-operated and third-party applications give customers real-time information about data use and send warnings as data use approaches important thresholds.[74]

Even if Frischmann and van Schewick are correct that tracking tools lower the transaction costs of simple metered pricing, investors may be wary of pricing strategies that cover significant fixed installment costs through purely volume-based rates. By definition, the fixed costs stay relatively constant, while variations in aggregate monthly consumption may leave the company without sufficient revenue to meet those costs. In that circumstance, the company may have to raise rates, which customers are unlikely to appreciate as a reward for their conservation.

Simple metered pricing also might prove a challenge for consumers. Although many consumers could pay less under a metered system, Andrew Odlyzko stresses the importance of "mental transaction costs," the cost to consumers of the mental effort required to sort out the many available choices in an increasingly complicated world.[75] After facing choices all

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69. *See* Christopher S. Yoo, *Network Neutrality and the Economics of Congestion*, 94 GEO. L.J. 1847, 1868 (2006).

70. *See id.*

71. *See id.*

72. Brett M. Frischmann & Barbara van Schewick, *Network Neutrality and the Economics of an Information Superhighway: A Response to Professor Yoo*, 47 JURIMETRICS J. 383, 394 (2007).

73. *See id.*

74. Verizon and AT&T each offer applications, known as My Verizon and myAT&T, respectively, that report a customer's data use as measured by the company's remote servers. Several third-party applications, such as 3G Watchdog, reports usage by tracking information as it flows through the device itself. *See generally* Ed Rhee, *How to Track Data Usage on Your Android Phone*, CNET (July 8, 2011, 2:15 PM), http://howto.cnet.com/8301-11310_39-20077775-285/how-to-track-data-usage-on-your-android-phone/.

75. Odlyzko credits Nick Szabo with originating the phrase, "mental transaction costs," to describe the difficulty of implementing micropayment regimes. *See* ODLYZKO ET AL., *supra* note 10, at 72; Andrew Odlyzko, The History of Communications and its

day, consumers may simply find it fatiguing to have to decide whether downloading a movie in HD rather than standard definition is worth the additional bandwidth cost.[76] Odlyzko also notes that unlimited use plans have an insurance effect: some customers may prefer to pay more for unlimited service in order to be protected from bill shock during a period of unusually high broadband usage (if, for example, a child unwittingly downloads significant quantities of data).[77] Odlyzko argues that the decision fatigue and insurance effects likely explain the results of 1970s AT&T studies showing light-use local telephone customers preferred flat-rate billing over per-minute billing, even though they would likely pay less under a metered regime.[78] Similarly, in the late 1990s AT&T Worldnet dial-up customers typically moved from metered rates to a $19.95 flat rate for unlimited use when their metered rates approached $11-12/month.[79] These studies suggest that many consumers are willing to pay a premium to avoid having to make a cost-benefit analysis of each broadband transaction.

2. Data Caps and Tiered Service Models

Like simple metered service, data caps help broadband companies shift more network costs onto heavier users. All customers pay the same flat rate for service up to the cap, and heavier users pay an additional amount per unit for consumption beyond the cap. Like metered pricing, data caps help solve some of the inefficiencies of flat-rate service. The overage charge becomes a way to mitigate the cross-subsidy by recovering a greater portion of network costs from heavier users. Tiered service plans increase customer choice by offering consumers several different monthly data plans. Heavier users will choose a larger monthly data allotment, which is priced higher than the lower tiers purchased by lighter users. In that way, the price difference between large and small plans helps ameliorate the cross-subsidy by recovering more revenue from heavier users.

Monthly data plans help ameliorate some of the stress that simple metering places on consumers. As noted above, many fixed wireless providers have adopted soft data caps set well above the average consumer's monthly use. For most consumers, this data cap provides the same predictability of the flat-rate model and spares them the mental accounting costs of a strictly metered regime. Most consumers will receive peace of mind knowing that unless they dramatically increase their online activity, they will remain under the cap and can predict with certainty their

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Implications for the Internet 7 (June 16, 2000) (unpublished manuscript) (on file with AT&T Research Labs), *available at* http://www.dtc.umn.edu/~odlyzko/doc/history.communications0.pdf.

76. *See* ODLYZKO ET AL., *supra* note 10, at 44.
77. *See id.* at 41 (describing the results of AT&T studies conducted in the 1970s).
78. *See id.* at 44.
79. *See id.* at 43.

monthly broadband costs. Of course, if a company adopts a single soft data cap for all customers, the company must monitor average use and adjust the cap periodically to assure that the cap remains well above the average user's monthly consumption. Otherwise customers will begin to suffer from the mental fatigue that Odlyzko describes.

Wireless data plans force consumers to think more carefully about their data consumption. As described above, many wireless providers offer several tiers of service, but even the largest tier of service is rarely sufficient for a customer to conduct all of his or her Internet activity wirelessly. This leads wireless broadband customers to conserve their wireless data use where possible, for example by using Wi-Fi to offload traffic from 3G and 4G networks to less congested fixed broadband networks. Of course, even under high fixed broadband data caps, heavier users must monitor their usage and evaluate the cost of activities that might push them over the cap. But if, as AT&T's iPhone user data suggests, the network's heaviest users are likely to be the most technologically savvy,[80] then this segment may better understand their data consumption patterns and may suffer less mental fatigue from calculating whether the additional megabyte consumption of an online activity is worth the price.

B. Recovering Costs Through Price Discrimination

1. Marginal and Fixed Broadband Costs

Some commentators have questioned the notion that usage-based pricing helps broadband providers recover their costs more efficiently. They argue that it is a mistake to recover more network costs from heavier users because heavy users contribute little marginal cost to network operations.[81] Odlyzko notes that statistical multiplexing allows multiple users to share the same bandwidth simultaneously, meaning that each additional user imposes only trivial marginal costs onto the network.[82] Although Odlyzko concedes that "determining the actual cost of using a broadband network is exceedingly difficult,"[83] a New York Times editorial states that "moving an extra gigabyte of data at off-peak times costs virtually nothing."[84] Similarly, Netflix, which is responsible for almost a third of all peak-time downstream traffic and therefore sees data caps as a

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80. INFORMA TELECOMS & MEDIA, UNDERSTANDING TODAY'S SMARTPHONE USER: DEMYSTIFYING DATA USAGE TRENDS ON CELLULAR & WI-FI NETWORKS 5 (2012), *available at* http://www.informatandm.com/wp-content/uploads/2012/02/ Mobidia_final.pdf; *see also supra* text accompanying note 44.

81. *See* Hibah Hussain et. al., *Capped Internet: No Bargain for the American Public*, NEW AMERICA FOUND. (Feb. 20, 2013), http://newamerica.net/publications/policy/ capped_internet_no_bargain_for_the_american_public.

82. ODLYZKO ET AL., *supra* note 10, at 17.

83. *Id.* at 19.

84. *To Cap, or Not: Broadband Limits Need to be Carefully Monitored to Promote Innovation and Competition*, N.Y. TIMES, July 21, 2011, at A20.

threat to business growth, claims that "the marginal cost of providing an extra gigabyte of data . . . is less than one cent, and falling."[85] As a result, Netflix general counsel David Hyman asserts that there is "no good reason for bandwidth caps and fees to take root."[86] For this reason, skeptics claim it is "entirely inaccurate" to suggest that average users subsidize heavier "bandwidth hogs."[87] Free Press, Public Knowledge, and other public interest groups have thus asked regulators and antitrust enforcers to investigate the industry's use of data caps because the caps lack any "legitimate economic justification."[88]

As an initial matter, the call for additional oversight on these grounds seemingly reflects a misunderstanding of the role of regulation. Underlying this critique is the unstated premise that equitable cost distribution is the only presumptively "legitimate" broadband pricing strategy, and companies must justify to the regulator any deviation from this model. While an equality standard has an intuitive appeal,[89] there is no reason to believe that it represents the only, or even the best, broadband pricing structure.

Generally, when companies experiment with different pricing strategies, they can test potentially more efficient business models.[90] If these new models prove less efficient, companies will abandon them. This experimentation brings consumers the benefits of increased competition and increased choices in the marketplace. Normally, the regulator should intervene only if the practice actually harms consumers and consumers cannot punish the practice because the company has market power.[91] Otherwise, companies should be presumptively permitted to experiment with alternative forms of cost recovery because experimentation helps the industry test potentially more efficient methods of operation.

But setting aside this general objection, focusing on only the marginal cost of each gigabyte of capacity tells us little about efficient broadband pricing.[92] It is true that, except during periods of congestion, the

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85. David Hyman, *Why Bandwidth Pricing is Anti-Competitive*, WALL ST. J. (July 7, 2011, 7:01 PM), http://online.wsj.com/article/SB10001424052702304447804576414220570134518.html.

86. *Id.*

87. ODLYZKO ET AL., *supra* note 10, at 17.

88. Letter from Free Press, *supra* note 10, at 2; *see also Petition to Enforce Merger Conditions*, *supra* note 12.

89. *See, e.g.*, Matthew Edwards, *Price and Prejudice: The Case Against Consumer Equality in the Information Age*, 10 LEWIS & CLARK L. REV. 559, 583-85 (2006). Edwards notes an Annenberg Public Policy Center report that concludes consumers "overwhelmingly object" to differential pricing as "ethically wrong." *See id.* at 585 (citing JOSEPH TUROW ET AL., OPEN TO EXPLOITATION: AMERICAN SHOPPERS ONLINE AND OFFLINE 4 (2005), *available at* http://repository.upenn.edu/ cgi/viewcontent.cgi?article=1035&context=asc_papers).

90. *See* Edwards, *supra* note 89, at 586-91.

91. *See, e.g.*, Comcast Cable Commc'ns, LLC v. FCC, 717 F.3d 982, 990 (D.C. Cir. 2013) (Kavanaugh, J., concurring) (collecting sources).

92. Scott Wallsten, *Data Caps Aren't Perfect, But That's OK*, ARS TECHNICA (May 11, 2012, 11:29 AM), http://arstechnica.com/tech-policy/2012/05/opinion-data-caps-arent-perfect-but-thats-okay/.

marginal costs of additional bandwidth consumption are very small.[93] But emphasizing marginal costs ignores the significant sunk costs required to build and maintain a broadband network. As Gregory Sidak explains, investors will fund these networks only if they can reasonably expect that the company will recover the costs of this investment, including a competitive return on capital.[94] Marginal cost pricing is thus insufficient because it does not provide sufficient revenue to cover the network's fixed costs.[95]

In the broadband industry, those costs are significant. Broadband providers have invested over $300 billion in private capital in the past decade to build and upgrade the nation's broadband networks.[96] These investments include nearly $23 billion that Verizon has invested in FiOS, which boosts broadband speeds and capacity by replacing legacy copper telephone wire with higher-speed fiber optic cable in portions of its footprint.[97] AT&T has also spent several billion dollars on fiber upgrades.[98] In the wireless sector, providers spent nearly $20 billion in 2008 to acquire spectrum when the 700 MHz block was freed up by the digital television transition, and are investing billions more to develop those assets into high-speed LTE data networks.[99] Of course, some broadband companies can recover these costs partly through voice and cable services that network upgrades also make available.[100] But a recent FCC report suggests that "as

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93. *See* Hyman, *supra* note 85.

94. J. Gregory Sidak, *A Consumer-Welfare Approach to Network Neutrality Regulation of the Internet*, 2 J. COMP. L. & ECON. 349, 357 (2006).

95. *Id.*; *see also* Wallsten, *supra* note 92.

96. CRAIG MOFFETT, U.S. TELECOMMUNICATIONS AND CABLE & SATELLITE: CAPITAL PUNISHMENT 6 (Bernstein Research) (Dec. 2010); *see also* Randolph J. May, *Prices and Profits in the Broadband Marketplace*, FREE STATE FOUND. (August 11, 2011, 1:50 PM), http://freestatefoundation.blogspot.com/2011/08/ prices-and-profits-in-broadband.html. The Columbia Institute for Tele-Information estimates that broadband providers invested $69 billion in 2008 and $60 billion in 2009 alone, of which approximately half was attributable to broadband service (as opposed to other services that the companies provide). *See* Larry F. Darby & Joseph P. Fuhr Jr., *Innovation and National Broadband Policies: Facts, Fiction, and Unanswered Questions in the Net Neutrality Debate*, 20 MEDIA L. & POL. 3, 11-12 (2011).

97. *See* MOFFETT, *supra* note 96, at 28.

98. As Moffett notes, Verizon's FiOS service provides fiber-optic cable to the consumer's home. By comparison, AT&T's U-Verse project provides fiber-optic cable to a neighborhood node, but relies upon legacy copper wire to transmit data from the node to individual homes. By avoiding the last-mile fiber drop, AT&T has spent much less per subscriber than Verizon. But Verizon's network will deliver greater speeds and capacity as Internet demand continues to grow. As Moffett writes, "Verizon's network is inarguably future-proof. AT&T's is not." *Id.*

99. Eric Bangeman, *700 MHz Spectrum Auction Wraps Up, Tops $19.5 Billion*, ARS TECHNICA (Mar. 18, 2008, 5:57 PM), http://arstechnica.com/uncategorized/2008/03/ 700mhz-spectrum-auction-wraps-up-tops-19-5-billion/.

100. *See* ODLYZKO ET AL., *supra* note 10, at 20-21. To the extent that these costs are directly attributable to other services alone (such as the cost of new set-top boxes for cable customers), they should be excluded from the broadband cost base. But much of these firms' network investment consists of common costs: upgrades to the network that benefit both broadband and other services. There are many ways that these common costs can be

much as two-thirds of current investments are being made to provide and expand wired and wireless broadband" rather than voice or cable service, and "the trend over the past few years has been growing."[101] Moreover, as subscribership rates fall, telecommunications companies must look increasingly to broadband rates to recover these common costs.[102] Investment analyst Craig Moffett estimates that the return on these investments has been flat to negative over the past decade.[103] He further warns that "[c]ompanies whose ROICs [Return on Investment Capital] fail to exceed their costs of capital or whose marginal ROICs are weak are likely to face stiff headwinds in the capital markets" and will be unattractive to investors going forward.[104]

These fixed costs are not merely one-time investments. Rather, "sunk investment is made continuously over time" as firms continue to expand and upgrade their networks to meet rising demand.[105] Cisco Systems anticipates that American IP traffic will triple between 2012 and 2017, representing a twenty-three percent compound annual growth rate.[106] Mobile data will grow at an even faster rate: Cisco estimates that mobile traffic will grow nine-fold by 2017, or fifty-six percent each year between now and then.[107] This increase is driven by consumer demand for greater quantities of and more bandwidth-intensive Internet content and applications, such as streaming video and real-time teleconferencing.[108] According to Sandvine, real-time entertainment comprised fifty-nine percent of peak-time traffic on fixed networks, up from twenty-nine percent in 2009, and fifty percent of peak mobile traffic, up from eleven percent

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allocated among the company's services. As discussed below, Ramsey pricing suggests that a multiproduct firm should recover its common costs by raising prices on both products in a way that preserves the ratio of consumption that would occur if the rates were priced at marginal cost. This means raising prices more on price-inelastic services than on price-elastic ones. *See, e.g.*, William Baumol & David Bradford, *Optimal Departures from Marginal Cost Pricing*, 60 AM. ECON. REV. 265, 265-83 (1970); Frank Ramsey, *A Contribution to the Theory of Taxation*, 37 ECON. J. 47, 47-61 (1927). Elasticity estimates vary widely among studies, but it is quite possible that broadband service is more inelastic than cable or telephone service, given the wider range of services that broadband makes available. If this is true, then Ramsey pricing suggests much of these common costs should be recovered through broadband prices rather than cable or telephone rates.

101. ROBERT C. ATKINSON & IVY E. SCHULTZ, BROADBAND IN AMERICA: WHERE IT IS AND WHERE IT IS GOING (ACCORDING TO BROADBAND PROVIDERS) 11 (2009) (prepared for FCC's Omnibus Broadband Initiative).

102. *See, e.g.*, MOFFETT, *supra* note 96, at 11 ("Carriers have no choice but to invest in the network to keep it operational, and are allocating 'growth capital' to it by building-out expensive fiber infrastructures. At the same time, highly profitable traditional voice subscribers are fleeing in droves, leaving the network to support fewer operating profit dollars.").

103. *See id.* at 1.

104. *Id.* at 12.

105. Sidak, *supra* note 94, at 357.

106. *VNI Forecast Highlights*, *supra* note 1 (click "Filter by Country", click the United States, and click "2017 Forecast Highlights").

107. *Id.* (same instructions).

108. Sandvine 2012, *supra* note 3, at 6, 9; Sandvine 2011, *supra* note 3, at 6.

only three years ago.[109] As a result, analysts estimate that broadband providers must continue to invest $30 billion to $40 billion annually to expand and upgrade their networks to meet this growing demand.[110]

2. The Potential Value of Price Discrimination

For broadband providers and other industries with significant fixed costs, the challenge is therefore to design a pricing structure that spreads fixed costs intelligently across the company's customer base. There are many possible ways that a company may do so, but there is no economic reason to believe that, because incremental marginal costs are small, fixed costs should be shared equally across all consumers. In fact, writes economist Scott Wallsten, "efficient pricing will, in general, charge users with high demand more than users with low demand *even if those users impose no additional costs on the network*."[111] This practice is known as "price discrimination."[112]

Price discrimination occurs when a company sells similar goods to different buyers based on their willingness to pay, rather than the cost of service.[113] Or in economic terms, it is when a company's sales exhibit different ratios of price to cost.[114] Price discrimination stems from the recognition that different customers have different *reservation prices*, the maximum rate that a customer is willing to pay for a good or service.[115] Its success depends first upon the firm's ability to identify and charge more to those customers who have higher reservation prices, and second on customers' inability to arbitrage the price difference.

Although "price discrimination gets a bad name in part because it sounds sinister,"[116] it is a fairly common practice throughout society (although sometimes it goes by the more benign term "customer segmentation"). Matthew Edwards notes that many movie theaters provide discounts to senior citizens and children, thus charging adult non-senior customers more for the same good.[117] Publishers offer titles at different rates to consumers and institutional buyers, such as colleges and

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109. Sandvine 2011, *supra* note 3, at 6, 10.

110. *See, e.g.*, May, *supra* note 96; ATKINSON & SCHULTZ, *supra* note 101, at 11.

111. Wallsten, *supra* note 92.

112. As Brett Frischmann notes, not all usage-based pricing may constitute price discrimination. To the extent that a company charges different rates in order to recover different customers' congestion costs, the rate structure is better described as cost-based differential pricing. See BRETT FRISCHMANN, INFRASTRUCTURE 122 (2012).

113. Edwards, *supra* note 89, at 562.

114. *Id.*; *see also* Daniel J. Gifford & Robert T. Kudrle, *The Law and Economics of Price Discrimination in Modern Economies: Time for Reconciliation?*, 43 U.C. DAVIS L. REV. 1235, 1239–40 (2010).

115. HERBERT HOVENKAMP, FEDERAL ANTITRUST POLICY: THE LAW OF COMPETITION AND ITS PRACTICE § 1.1, at 4 (3d ed. 2005).

116. *See* ROBERT D. ATKINSON & PHILIP J. WEISER, INFO. TECH. & INNOVATION FOUND., A "THIRD WAY" ON NETWORK NEUTRALITY 6 (May 30, 2006).

117. *See* Edwards, *supra* note 89, at 563.

libraries.[118] And a car dealership may sell the same model automobile to different customers at different prices, if one customer is better at haggling and a discount is needed to close the sale.[119] Although each of these sellers is engaged in "discrimination," these price differences are a legal and largely uncontroversial practice.[120] Price discrimination can be lucrative for producers, because it allows them to increase revenue by charging higher prices to those who place a higher value on the product.

The practice has more ambiguous effects on customers and total welfare, though antitrust scholar Herbert Hovenkamp notes that "most price discrimination is socially beneficial."[121] Hovenkamp explains that the practice often "produces higher output and thus yields greater consumer benefits than forced nondiscriminatory pricing."[122] One oft-cited example is the airline industry, which exhibits a cost structure similar to broadband providers and where price discrimination occurs regularly.[123] Assume, for example, that an airline's average cost to transport a passenger on a full flight is $700. This amount would be sufficient to cover the passenger's small marginal costs (primarily the in-flight meal) and a pro rata portion of the flight's fixed costs (such as fuel, employee salaries, and the installment payment for the plane). The business traveler, racing to town for a meeting, may pay $1000 for her ticket, while the college student who is heading home may pay only $500 for the next seat over.[124] The businessperson likely has a higher reservation price than the college student, because of the greater demands on her time. By charging the businessperson a higher price, the airline can secure from her a greater contribution to the airline's fixed costs. This contribution allows the airline to offer a discounted ticket to the student.

In this hypothetical, the ability to price discriminate allows the airline to serve more customers than under a flat-rate system. If the airline were instead forced to charge a single uniform rate of $700, the student and

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118. *Id.*

119. *Id.*

120. *Id.* at 582; *see, e.g.*, Langford v. Rite Aid of Ala., Inc., 231 F.3d 1308, 1309 (11th Cir. 2000) (finding no duty to disclose prices or avoid price discrimination between insured and uninsured purchasers of pharmaceuticals); Bonilla v. Volvo Car Corp., 150 F.3d 62, 71 (1st Cir. 1998) (observing that "there is nothing in the law of fraud that prevents even a single seller from charging different markups in different markets so long as there is no affirmative misrepresentation"). As Professor Edwards notes, the Robinson-Patman Act prohibits price discrimination in certain commercial transactions of commodities, if the two buyers are competitors and the sale harms competition between them. Edwards, *supra* note 89, at 577-78. But this act does not protect end-user consumers (who are not competitors), for good reason. *Id.* at 582-83.

121. *Id.* at 588 (quoting HERBERT HOVENKAMP, ANTITRUST LAW ¶ 2340c, at 139).

122. *Id.*; *see also* Babette E.L. Boliek, *FCC Regulation vs. Antitrust: How Net Neutrality is Defining the Boundaries*, 52 B.C. L. REV. 1627, 1678 (2011) ("Although 'discrimination' has a negative popular association, in economic theory, price discrimination may actually serve to increase consumer welfare.")

123. Wallsten, *supra* note 92; Philip J. Weiser, *The Next Frontier for Net Neutrality*, 60 ADMIN. L. REV. 273, 282 (2008).

124. *See* Wallsten, *supra* note 92.

others with lower reservation prices would not be able to fly. Moreover, the airline might not be able to sell enough $700 tickets to fill the airplane, which would mean the uniform rate would have to be greater than $700 to cover the flight's fixed costs.[125] Of course, the airline could sell more tickets at a $500 rate, but this rate would fail to cover the airline's fixed costs. If airlines were forbidden from engaging in price discrimination, many customers who currently receive discounted fares would have to pay more for airline tickets, and many would instead choose not to fly at all.[126] Price discrimination allows the airline to capture more revenue from those willing to pay more, while expanding service to customers with lower reservation prices.

Of course, price discrimination works only if the company can successfully separate customers by reservation price. Ideally, a company would like to charge each customer exactly the maximum that the customer is willing to pay for the good—a scenario known as "first-degree price discrimination."[127] In reality, first-degree price discrimination is virtually impossible to achieve, so companies must devise strategies to segment the customer base in ways that successfully charge more to those willing to pay more.[128] One way airlines distinguish business executives from students is by offering separate first-class and coach tickets. First-class fares include additional perks designed to appeal to executives, perks for which they are willing to pay extra but which do not add measurably to the marginal cost of service. Another way is to put restrictions on discount tickets that would discourage executives from buying. For example, requiring a twenty-one-day advance purchase to receive the discounted rate drives executives toward a higher fare, since business trips are often scheduled at the last minute and cannot be predicted three weeks in advance.[129] Similarly, offering the discount only in conjunction with a Saturday stay is an

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125. In this hypothetical, one can assume that the airline cannot sell all its seats at a $700 rate. Otherwise, it would not have sold a $500 ticket to the student.

126. ATKINSON & WEISER, *supra* note 116, at 282.

127. Edwards, *supra* note 89, at 566-68.

128. Economists divide imperfect price discrimination into two categories: second-degree price discrimination, where the price per unit varies based upon the quantity (or sometimes, the quality) of the good purchased, and third-degree price discrimination, where the price varies based on some identifiable characteristic of the consumer. See, e.g., FRISCHMANN, *supra* note 112, at 17. Usage-based pricing constitutes second-degree price discrimination, which Frischmann finds less problematic because it is more compatible with nondiscrimination norms that govern many networked industries: all consumers are presented with the same price schedule and the consumers themselves choose how much service to purchase. *Id.* at 122. To the extent that the network's price schedule differentiates among customers, it does so only on a very general basis (such as charging residential customers and businesses different rates), which reflects differences in the cost to serve the group, differences in demand among groups, and group elasticity of demand. *Id.*

129. Edwards, *supra* note 89, at 566-68.

inconvenience for business executives who would rather spend their weekends at home with their families.[130]

3. Ramsey Pricing and Price Discrimination in the Broadband Industry

In the broadband industry, as with many industries marked by high fixed costs, price discrimination based on customers' willingness to pay is an efficient way to recover costs with minimal distortion to overall social welfare.[131] This practice, familiar to many regulated industries, is known as "Ramsey pricing."[132] Ideally, a firm maximizes overall social welfare by pricing its goods at marginal cost: this ensures that the company serves every customer who values the good at or above the cost of producing it.[133] But as noted above, broadband providers cannot use marginal cost pricing because they need to recover fixed costs[134] and fund future network investments. With Ramsey pricing, firms recover these fixed costs by raising prices more on those who are most willing to pay for the service, and less on those who would buy less (or not at all) if the price rose.[135] Or in economic terms, the firm sets prices in inverse proportion to customers' price elasticity of demand.[136] In an ideal world, where the firm can perfectly separate each customer by his or her elasticity, Ramsey pricing would allow the firm to recover all of its costs while ensuring that few if any consumers who value the service at marginal cost will ever be priced out of the market.[137]

Usage-based pricing strategies incorporate Ramsey pricing principles. By paying for consumption, consumers reveal how much they value broadband access. This form of price discrimination allows providers to recover more network costs from those whose consumption is least sensitive to changes in price. The extent to which the pricing strategy approximates Ramsey efficiency depends on the company's ability to separate customers by willingness to pay. Simple per-unit metered pricing

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130. Of course, firms can price discriminate for reasons other than finding customer reservation prices. For example, many airlines offer bereavement fares for families traveling to funerals, despite the fact that a funeral is an important event and the customer may have a high reservation price to get to the event on time. This form of humane price discrimination would also be impossible if airlines were required to charge a uniform flat rate per seat.

131. Sidak, *supra* note 94, at 368.

132. *Id.*; see also YOO, *supra* note 24, at 101-03.

133. Michael E. Levine, *Price Discrimination Without Market Power*, 19 YALE J. ON REG. 1, 9 (2002).

134. Wallsten, *supra* note 92.

135. Levine, *supra* note 133.

136. *See, e.g.*, Daniel F. Spulber & Christopher S. Yoo, *Toward a Unified Theory of Access to Local Telephone Networks*, 61 FED. COMM. L.J. 43, 85 n.205 (2008); *see generally* Baumol & Bradford, *supra* note 100, at 267 (discussing the rules that determine whether a price-output combination is socially optimal); Ramsey, *supra* note 100, at 47-48, 58-59 (discussing the relationship between price discrimination, revenue, and utility).

137. Levine, *supra* note 133, at 9.

segments customers substantially, correlating each consumer's total bill with the value that consumer receives from network use. If heavy users are highly price inelastic, a higher per-unit charge for consumption above a certain threshold may get even closer to Ramsey efficiency. By comparison, a data cap divides the customer base into only two groups (typical users, who do not exceed the cap, and heavy users, who do), but the overage charge allows the company to further segment the heavy user group based on the amount by which each customer exceeds the cap. Tiered data pricing lies somewhere between these two poles. By allowing customers to choose from an array of possible monthly limits, the provider can segment its customer base more finely than with a simple cap, though not as much as per-unit metering. The provider can experiment with different tiers and different rates per tier until it finds the pricing structure that best covers its fixed costs.

Speed-based pricing strategies may similarly approximate Ramsey efficiency, although the customer segments differ somewhat from those revealed by monthly data plans. Speed tiers segment the customer base by varying *quality* of service, while data tiers vary *quantity* of service. Speed tiers help broadband providers identify customers who use more advanced Internet applications, such as online gaming and video conferencing, which perform less-than-optimally at low speeds.[138] But speed tiers alone cannot help differentiate the heavy gamer from the "sampler" of advanced services, such as the grandma who occasionally tries to video-chat with her grandchildren.[139] On the other hand, data tiers lump together all who upload or download large quantities of material, which does not distinguish Netflix streamers from less sophisticated consumers who happen to use a nightly cloud-based backup service. By experimenting with different pricing plans, broadband providers can test the price elasticity of different customer segments, to discover through revealed preferences which price discrimination model is most efficient.

Some view price discrimination skeptically because they assume the practice shows that the firm has market power.[140] But as a unanimous Supreme Court recently recognized, "while price discrimination may provide evidence of market power . . . it is generally recognized that it also occurs in fully competitive markets."[141] The Court's holding is consistent with more recent scholarship suggesting that price discrimination is often a byproduct of healthy competition among firms. William Baumol and Daniel Swanson have explained that competition compels firms to charge

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[138] See Lyons, *supra* note 39.

[139] *Id.*

140. *See, e.g.*, Gloria J. Hurdle & Henry B. McFarland, *Criteria for Identifying Market Power: A Comment on Baumol and Swanson*, 70 ANTITRUST L.J. 687, 693 (2003); Jonathan B. Baker, *Competitive Price Discrimination: The Exercise of Market Power Without Anticompetitive Effects (Comment on Klein and Wiley)*, 70 ANTITRUST L.J. 643, 644 (2003) ("Price discrimination is properly understood as providing evidence of market power, as antitrust law has long recognized.").

141. Ill. Tool Works, Inc. v. Indep. Ink, Inc., 547 U.S. 28, 44-45 (2006).

lower prices to price sensitive consumers when possible.[142] When companies have significant fixed costs, new firms can enter the market and customers can be segmented by demand.[143] Companies must therefore resort to price discrimination or else they will fail to cover their costs.[144] Michael Levine similarly argues that in firms with high fixed costs, price discrimination will often be the dominant pricing strategy even in the absence of market power.[145] Under these conditions, Baumol and Swanson argue, price discrimination may be inevitable and "firms may be able to indulge persistently in uniform pricing only if they possess the sort of monopoly power that forecloses such competition and enables them to obtain abundant earnings."[146]

4. Price Discrimination and Increasing Broadband Penetration Rates

Usage-based pricing may also make entry-level broadband access more affordable.[147] The FCC has stated that increasing broadband adoption rates is one of its biggest public policy challenges.[148] While sixty-five percent of Americans have broadband access, those without access are generally "older, poorer, less educated, more likely to be a racial or ethnic minority, and more likely to have a disability" than those with broadband in the home.[149] According to the Commission's survey, those without broadband access cited cost as the primary barrier to adoption.[150] A 2009 report by Kevin Hassett and Robert Shapiro similarly concludes based upon several studies that "price is the strongest determinant of broadband

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142. William J. Baumol & Daniel G. Swanson, *The New Economy and Ubiquitous Competitive Price Discrimination: Identifying Defensible Criteria of Market Power*, 70 ANTITRUST L.J. 661, 674, 669-70 (2003); *see also* Sidak, *supra* note 94, at 367-68; *see generally* Joshua D. Wright, *Missed Opportunities in* Independent Ink, 2006 CATO SUP. CT. REV. 333, 339, 341, 348 (2006) (discussing competitive price discrimination).

143. Baumol & Swanson, *supra* note 142, at 662.

144. *Id.*

145. *See* Levine, *supra* note 133, at 8.

146. Baumol & Swanson, *supra* note 142, at 662.

147. *Cf.* Sidak, *supra* note 94, at 367 (competition forces firms to lower the price they charge to price-sensitive consumers).

148. FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN 167 (2010) [hereinafter NATIONAL BROADBAND PLAN], *available at* http://download.broadband.gov/plan/national-broadband-plan.pdf.

149. *Id.* at 168. According to the Commission's report, those over age sixty-five have a thirty-five percent adoption rate. The rate for low-income consumers (defined as having household income below $20,000 per year) is forty percent. For those without a high school diploma, the rate is twenty-four percent. Among African-Americans, the adoption rate is fifty-nine percent, while among Hispanic Americans the rate is forty-nine percent. Only forty-two percent of the disabled have broadband. *Id.*

150. *Id.* at 168, 170. Thirty-six percent of respondents cited cost as the primary reason they do not have broadband access, followed by lack of digital literacy (twenty-two percent) and relevance (nineteen percent).

subscription."[151] After projecting broadband adoption rates under different pricing models, Hassett and Shapiro concluded that "spreading [broadband] costs equally among all consumers—the minority who use large amounts of bandwidth and the majority who use very little—will significantly slow the rate of adoption at the lower end of the income scale."[152] If broadband providers can shift more network costs onto heavier users, they can offer lower rates for light users. This practice benefits firms and consumers alike: it allows firms to capture more of the demand curve, offering service to more people who value the service above marginal cost, while at the same time it narrows the "digital divide" between those who can afford broadband access and those who cannot.[153]

Of course, price discrimination only leads to higher adoption rates if broadband providers in fact reduce prices for lighter users. This appears to be the case. A 2010 study by Scott Wallsten and James Riso surveyed more than 25,000 broadband plans across several OECD countries.[154] They found that residential broadband plans with data caps were, on average, about $164 less per year than similar but unlimited plans, while residential triple play plans (which combine broadband, voice, and video) were $152 less per year if they contain a data cap.[155] As a result, Wallsten and Riso concluded that "many consumers, particularly the low-volume users, are likely to pay less for broadband with data caps than they would for plans offering unlimited data transfer."[156]

In the United States, Comcast has used pricing innovation to bring basic Internet access to low-income consumers. In 2011, the company introduced its "Internet Essentials" plan, which offers eligible consumers a low-speed-tier plan (5 Mbps download, 1 Mbps upload) for $9.95 per month.[157] In its first two years, the company signed up 220,000 households,

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151. KEVIN A. HASSETT & ROBERT J. SHAPIRO, TOWARDS UNIVERSAL BROADBAND: FLEXIBLE BROADBAND PRICING AND THE DIGITAL DIVIDE 4-5 (Aug. 2009) (Georgetown Center for Business and Public Policy), *available* at http://www.gcbpp.org/files/Academic_Papers/AP_Hassett_Shapiro_Towards.pdf (citing, among other sources, PAUL RAPPOPORT ET AL., WILLINGNESS TO PAY AND THE DEMAND FOR BROADBAND SERVICE (2003), *available at* http://www.economics.smu.edu.sg/events/Paper/Rappoport_3.pdf; AUSTAN GOOLSBEE, THE VALUE OF BROADBAND AND THE DEADWEIGHT LOSS OF TAXING NEW TECHNOLOGY (2006), *available at* http://faculty.chicagobooth.edu/austan.goolsbee/research/broadb.pdf; and JOHN HORRIGAN, HOME BROADBAND ADOPTION 2009 (2009) (Pew Internet & American Life Project), *available at* http://www.pewinternet.org/~/media/Files/Reports/2009/Home-Broadband-Adoption-2009.pdf).

152. HASSETT & SHAPIRO, *supra* note 151, at 12.

153. *Id.*

154. SCOTT WALLSTEN & JAMES L. RISO, RESIDENTIAL AND BUSINESS BROADBAND PRICES PART 1: AN EMPIRICAL ANALYSIS OF METERING AND OTHER PRICE DETERMINANTS 1 (Nov. 2010) (Technology Policy Institute), *available at* http://techpolicyinstitute.org/files/residential%20and%20business%20broadband%20prices%20pt1.pdf.

155. *Id.* at 16.

156. *Id.* at 3.

[157] See *Comcast*, 157 CableFAX Daily, Aug. 14, 2013, 2013 WLNR 20166462. The program also provides computers at subsidized rates and free digital literacy training.

or almost 900,000 consumers. This flexibility, in turn, likely helps boost broadband adoption rates. Because existing Comcast subscribers are ineligible, it is reasonable to assume that many Internet Essentials subscribers are households that did not previously have broadband access and could not afford, or otherwise chose not to purchase, more expensive plans with fewer limitations.

One also sees some evidence that price discrimination helps reduce wireless broadband prices, though the record is mixed. In June 2010, AT&T eliminated its $30/month unlimited data plan for smartphone users. Instead, customers could choose a 200-megabyte plan for $15 per month or 2 gigabytes for $25 per month.[158] If a customer exceeded his or her data cap, the company charged $15 for each additional 200 megabytes on the smaller plan or $10 for each additional gigabyte under the larger plan.[159] At the time of the change, sixty-five percent of AT&T customers used less than 200 megabytes of data each month, while ninety-eight percent used less than 2 gigabytes.[160] This meant that the move from unlimited to tiered service was less expensive for most AT&T customers and made wireless broadband a more affordable option for consumers who found the $30 flat rate unacceptable.[161] There were no comparable savings when Verizon Wireless phased out its $30/month unlimited data plan in June 2011, shortly after introducing the iPhone to its network. Henceforth, new Verizon customers could choose from three different tiers of service, the cheapest of which was 2 gigabytes per month at the same $30 rate as the old unlimited plan.[162]

Consumers are eligible if one member of the household is eligible to participate in the National School Lunch Program. See Internet Essentials, http://www.internetessentials.com/how-it-works (last visited Aug. 14, 2013). In markets where Comcast has monthly data limits, Internet Essentials customers are subject to the same restrictions as other residential subscribers.

158. *See* Press Release, AT&T, AT&T Announces New Lower-Priced Wireless Data Plans to Make Mobile Internet More Affordable to More People (June 2, 2010), *available at* http://www.att.com/gen/press-room?pid=17991&cdvn=news&newsarticleid=30854&mapcode=financial|mk-att-blackberry-torch.

159. *Id.*

160. *Id.*

161. *See* Press Release, AT&T, AT&T Launches New Data Plans (Jan. 18, 2012), *available at* http://www.att.com/gen/press-room?pid=22240&cdvn=news&newsarticleid=33672. The company raised its rates to $20/month for 300 megabytes, $30/month for 3 gigabytes, or $50/month for 5 gigabytes. This means that the 2012 entry-level price remains below the 2010 flat rate.

162. *See* Cecilia Kang, *Verizon Phasing Out Unlimited Mobile Data Plans*, WASH. POST, June 23, 2011, at A15.

IV. USAGE-BASED PRICING AS A CONGESTION MANAGEMENT TOOL

Usage-based pricing can also be a tool to compel more efficient network operation. If the price a customer pays for use reflects the cost that use imposes on the network, the customer is less likely to overuse the network. Usage-based pricing may also incentivize companies throughout the Internet ecosystem to adopt more efficient data-management practices. The extent to which usage-based pricing can help manage network congestion depends on the nature of congestion and the feasibility of structuring a pricing strategy that would correlate prices with congestion costs.

A. Broadband Service and the Possibility of Congestion Costs

As Christopher Yoo and others have noted, unlimited flat-rate pricing plans "tend to induce excessive levels of congestion."[163] This is because broadband service is an example of what economists call a "club good."[164] A club good is one that exhibits some characteristics of a private good and some of a public good. Like a private good, a club good is excludable, meaning the owner can prevent consumers who have not paid from accessing the service.[165] This distinguishes club goods from purely public goods (such as broadcast television) and common pool resources (like fish in a public lake). But club goods are also non-rivalrous, meaning that they can be shared by more than one person at the same time.[166] This distinguishes them from typical private goods such as food or clothing. James Buchanan, the Nobel-prize-winning economist who devised the term, cited the community swimming pool as his primary example.[167] Other economists have shown how the cinema, cable television, and many social organizations can be club goods.[168] Broadband networks also fit the definition: the broadband provider may exclude consumers who have not

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163. Yoo, *supra* note 21, at 204.

164. *See* Yoo, *supra* note 69, at 1863-64 (describing broadband as a club good); William D. Rahm, *Watching Over the Web: A Substantive Equality Regime for Broadband Applications*, 24 YALE J. REG. 1, 18 (2007).

165. *See* Yoo, *supra* note 69, at 1863 (citing James Buchanan, *An Economic Theory of Clubs*, 32 ECONOMICA 1 (1965) and RICHARD CORNES & TODD SANDLER, THE THEORY OF EXTERNALITIES, PUBLIC GOODS, AND CLUB GOODS 351-53 (2d ed. 1996)).

166. *Id.* at 1863-64.

167. *Id.*; *see also* Patrick McNutt, *Public Goods and Club Goods*, *in* ENCYCLOPEDIA OF LAW AND ECONOMICS 936 (1999).

168. J. ANDREW HANSZ & DARREN K. HAYUNGA, CLUB GOOD INFLUENCE ON RESIDENTIAL TRANSACTION PRICES (Aug. 5, 2011), *available at* http://aux.zicklin.baruch.cuny.edu/jrer/papers/pdf/forth/accepted/Club%20Good%20Influence%20on%20Residential%20Transaction%20Prices.pdf.

paid for the service, but multiple consumers can use the network simultaneously.[169]

Because of these characteristics, club goods are affected by congestion costs, the marginal cost of additional network use. As implied by their name, congestion costs are the costs that one consumer's use imposes on other consumers, which in the broadband industry can take the form of packet delays or packet loss.[170] When the network is lightly loaded, congestion costs are "essentially zero."[171] But when the network is running near full capacity, the congestion costs created by an additional user can be substantial.[172]

As Yoo has shown, unlimited flat-rate pricing can lead to overconsumption because consumers do not directly pay the congestion costs that they impose on the network.[173] Ideally, a network provider would encourage each consumer to use the network as long as the benefit he or she gets from network use exceeds the cost of that use.[174] But under a flat-rate system, the consumer pays no additional cost for additional use, even when this consumption imposes congestion costs on society as a whole.[175] For example, a consumer may choose to watch a bandwidth-intensive movie or play interactive video games during peak times, even though this adversely affects the network's overall operations. The consumer suffers some congestion cost (because the movie or game may suffer some congestion-related packet delays), but this cost is less than the congestion costs that the consumer's decision imposes on all other network users.[176]

A broadband provider can alleviate congestion in two ways: it can add network capacity or it can ration access.[177] If congestion occurs regularly, the provider should invest capital to expand the network and

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169. See sources cited *supra* note 151.

170. When a broadband consumer requests Internet content from a server, the server breaks the content into a series of small packets, each of which travels across the Internet to the consumer. Once it arrives, the consumer's computer reassembles the packets into a message. Congestion occurs when more packets seek to pass through a particular bottleneck than that bottleneck can handle. This surge in demand forces the network to queue the packets, which can cause packet delay. If the queue gets too long, the network may simply delete some packets entirely, which creates packet loss. Generally speaking, packet delay and packet loss are more perceptible for consumers using real-time applications such as streaming video and video conferencing, because the consumer experience depends upon a continuous flow of packets at a relatively steady rate. *See* Yoo, *supra* note 69, at 1861-62.

171. ANDREA GRABER, INTERNET PRICING: ECONOMIC APPROACHES TO TRANSPORT SERVICES AND INFRASTRUCTURE 33 (2005).

172. *See id.* As noted above, congestion thus increases the marginal cost of serving a broadband consumer. *See supra* Part II.B.1.

173. *See* Yoo, *supra* note 21, at 204-05.

174. *See id.*

175. *See* Yoo, *supra* note 69, at 1864. It is worth noting, however, that providers of some club goods can rely on flat-rate pricing because many customers choose to consume only small amounts of club resources despite the fact that additional consumption is costless. Gym memberships are one notorious example. Stefano DellaVigna and Ulrike Malmendier, *Paying Not to Go to the Gym*, 96 AM. ECON. REV. 694, 695 (2006).

176. GRABER, *supra* note 171, at 2-3, 34; Yoo, *supra* note 69, at 1864.

177. GRABER, *supra* note 171, at 1-2.

provide more bandwidth to all users. But if congestion occurs only infrequently, expansion may be an inefficient solution, because it leads to significant expenditures for additional capacity that lies dormant most of the time. In this situation, rationing may be a better solution because it encourages consumers and network owners to manage existing capacity more efficiently. And the two are not mutually exclusive solutions: a provider may find rationing sufficient to address present congestion, but as consumers adopt increasingly intensive applications (such as streaming 4K Ultra HD video or telemedicine), the increased frequency with which congestion occurs may require the company to install additional capacity.

If done correctly, usage-based pricing can alleviate congestion by discouraging bandwidth overconsumption. A per-unit pricing strategy forces each consumer to internalize the congestion costs that marginal consumption imposes on others.[178] Ideally, the per-unit price would fluctuate to reflect the precise congestion cost of additional use at that time, though transaction costs may prohibit pricing at that level of precision.[179] By bringing a consumer's private costs into line with the overall social costs of additional use, usage-based pricing encourages a consumer to consume additional resources only if his or her benefit exceeds the total cost. Usage-based pricing thus can temper the activities of "bandwidth hogs" whose heavy consumption could impose substantial congestion costs on their neighbors.

Usage-based pricing also forces Internet content and application providers to be more efficient when sending content to consumers. Because consumers pay based upon bandwidth consumed, they demand that content and application providers deliver their services using as little bandwidth as possible. These consumer demands can encourage greater use of zipped files and other forms of compression, which leads to greater overall efficiency in network use. For example, Odlyzko notes that when Canada adopted usage-based pricing in 2011, Netflix responded by offering two tiers of service: a high-quality, heavy-bandwidth streaming service, or a low-quality alternative that consumes two-thirds less bandwidth.[180]

Finally, usage-based pricing can force broadband providers to operate more efficient networks. If a broadband company is paid by volume of traffic that passes through its system, it will manage traffic where possible to maximize that volume. As volume rises, the increased congestion signals to the broadband provider the need for additional capacity. But importantly, under usage-based pricing, the increased volume that generates the congestion also helps fund the network expansion.

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178. *See* Yoo, *supra* note 69, at 1874; ODLYZKO ET AL., *supra* note 10, at 14.

179. *See, e.g.*, ODLYZKO ET AL., *supra* note 10, at 55 ("Data sent or received during peak hours could be charged at rates that reasonably reflected their impact on network congestion. This practice could encourage users to manage their network usage more efficiently and reduce congestion generally.").

180. *Id.* at 14 (citing *Netflix Lowers Data Usage by 2/3 for Members in Canada*, NETFLIX (Mar. 28, 2011), http:// blog.netflix.com/2011/03/netflix-lowers-data-usage-by-23-for.html).

Some critics argue that usage-based pricing may encourage broadband providers to restrict capacity, thus creating artificial scarcity that allows the company to raise rates without investing in network expansion.[181] But this critique seems misplaced. A provider could create artificial scarcity only if it has market power, meaning it is insulated from competition. Otherwise, when a provider subjects customers to artificially high levels of congestion or low monthly limits, consumers will flee to another provider that is investing in its network to better meet demand.

But if a firm has market power, it may avoid additional capital investment whether it uses flat rates or usage-based rates. A monopolist charging usage-based rates may lower its data cap and use overage charges to pad its bottom line. But a monopolist offering flat rates may exploit this power by increasing the rate for unlimited service and pocketing, rather than reinvesting, the added revenue. The difference is that under usage-based rates, consumers make efficient use of the limited capacity available. In a capacity-constricted flat rate system, congestion rises until the only people using the network are those who can best tolerate lengthy service delays. This is what Jeffrey MacKie-Mason and Hal Varian call the "Yogi Berra equilibrium:" the point where the network is "so crowded that no one goes there anymore."[182] Thus while firms may have incentives to pad profits by restricting capacity, their ability to do so depends much more on their market power than their choice of pricing strategy.

Whether usage-based pricing can be a useful tool to manage broadband congestion turns on two subsidiary inquiries. First, how congested are broadband networks? And second, how easily can usage-based pricing target and alleviate that congestion?

B. Measuring Broadband Congestion

Although congestion is difficult to measure with certainty, and performance varies by network provider, many analysts have concluded that congestion is not presently a significant problem for fixed broadband networks.[183] The FCC's most recent survey of fixed broadband performance, released in July 2012, shows that the average fixed broadband provider delivered ninety-six percent of its advertised speeds during peak usage periods.[184] This was up from eighty-seven percent in 2011.[185] The Commission attributes this improvement to "improvements in

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181. See, e.g., ODLYZKO ET AL., *supra* note 10, at 56.

182. Jeffrey K. MacKie-Mason & Hal R. Varian, *Pricing Congestible Network Resources*, 13 IEEE J. OF SELECTED AREAS OF COMM. 1141, 1146 (1995), *quoted in* GRABER, *supra* note 171, at 137.

183. *See* Letter from Free Press, *supra* note 10, at 1.

184. FCC, 2012 MEASURING BROADBAND AMERICA JULY REPORT: A REPORT ON CONSUMER WIRELINE BROADBAND PERFORMANCE IN THE U.S. 10 (2012). Peak time is defined as weeknights from 7:00 p.m. to 11:00 p.m. local time, when aggregate network demand is typically highest. *Id.* at 8.

185. *Id.* at 10.

network performance" rather than downward adjustment on advertised speeds, noting that there was a thirty-eight percent increase in average speeds delivered to customers.[186] Peak-time performance varies somewhat based upon technology. During peak periods, fiber-based networks such as FiOS delivered 117% of advertised download speeds, while cable-based services delivered ninety-nine percent of advertised speeds and DSL-based services lagged behind, at just eighty-four percent of advertised speeds.[187]

Of course, this does not suggest that congestion is never a problem for fixed broadband networks. In 2008, the Commission sanctioned Comcast Corporation for throttling traffic between users operating peer-to-peer networks.[188] Comcast claimed throttling was necessary because these networks created an unexpected spike in demand for upload bandwidth, which imposed congestion costs on other consumers who shared upload bandwidth with someone operating a peer-to-peer network.[189] One can also infer some level of network congestion from the rise of the Content Delivery Network ("CDN") industry. Significant content providers such as Netflix rely on third-party CDNs such as Akamai and Level 3 Technologies to deliver their services.[190] CDNs store multiple copies of a content provider's data in locations across the country, and carry that data over their privately owned networks rather than the public Internet to a location on the broadband provider's network closest to the consumer. One advantage that CDNs offer to content providers is the ability to avoid potential congestion costs associated with the bottlenecks of the public Internet. More generally, Say's Law suggests that any installed capacity will eventually become saturated: greater network capacity drives greater demand for bandwidth-intensive applications that the additional capacity makes possible.[191] This suggests that congestion may be managed or brought into equilibrium for a time, but supports the idea that congestion can be a legitimate factor in pricing determinations for broadband providers.

Congestion is a much more significant issue for wireless providers.[192] As former FCC Chairman Genachowski and many commentators note, the smartphone revolution has unleashed tremendous demand for wireless applications and services. While wireless providers are investing billions of dollars to upgrade and expand network capacity, neither these efforts nor

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186. *Id*. at 5-6.

187. *Id.* at 10-11 (Peak-time upload speeds were 106% of advertised for fiber, 110% for cable, and 103% for DSL).

188. *See Formal Complaint of Free Press*, *supra* note 25, at 13031.

189. *Id.* at 13031-32. The Commission assumed without deciding that Comcast's factual claims were true and found targeted throttling of peer-to-peer traffic was an unreasonable method of alleviating network congestion. *Id.* at 13056.

190. *See* ODLYZKO ET AL., *supra* note 10, at 23-24.

191. *See* GRABER, *supra* note 171, at 6.

192. *See* ODLYZKO ET AL., *supra* note 10, at 21.

spectrum policy has been able to match that demand.[193] Industry analyst Peter Rysavy notes that the bandwidth-intensive mobile applications such as streaming video are "growing tremendously, and it's unclear how long operators will be able to keep up. In the absence of new spectrum, which does not seem to be materializing fast enough . . . the result will be networks running at capacity."[194] Given these dynamics, Rysavy concludes, "congestion is unavoidable."[195] This is reflected in the prevalence of tiered pricing in the wireless industry.

C. Usage-Based Pricing as a Congestion Management Tool

Although usage-based pricing encourages more efficient network consumption generally, many question its usefulness for alleviating congestion specifically. While data caps and tiered pricing have become prominent usage-based pricing strategies in the marketplace,[196] they are rather crude tools for addressing network congestion.[197] Data caps limit the amount of bandwidth that a customer uses each month. While this limit reduces overall traffic on the network, it does not directly target traffic during congestion periods. This is the equivalent of trying to solve rush-hour highway congestion by placing a limit on the number of miles each driver can drive each month. The cap may have some indirect effect on congestion, if heavy users choose to reduce consumption by reducing peak-time use. But the cap also targets heavy users who generate huge volumes of traffic during off-peak periods (for example, by backing up systems at 2:00 a.m.), whose uses generate virtually no congestion costs.[198] For this reason, Sandvine estimates that "monthly usage quotas have only a limited impact, if any at all, on peak network demand."[199]

If feasible, peak-time pricing could be a more effective usage-based strategy to alleviate congestion.[200] When facing rush-hour traffic congestion, London famously began charging commuters a fee to drive in the busiest part of town during peak times. This strategy has reduced

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193. *See, e.g.*, Interview by NCTA with Julius Genachowski, former Chairman, FCC, (2012); Joe Zeto, *Addressing Mobile Data Growth & Impending Network Congestion*, WIRELESS WEEK (Feb. 7, 2012, 5:07 PM), http://www.wirelessweek.com/articles/2012/02/technology-addressing-mobile-data-growth-impending-network-congestion-wireless-networks/.

194. PETER RYSAVY, INFORMATIONWEEK REPORTS, LTE: HUGE TECHNOLOGY, HUGE CHALLENGES 8 (Mar. 2012), http://www.rysavy.com/ Articles/2012_03_LTE.pdf.

195. PETER RYSAVY, RYSAVY RESEARCH, MOBILE BROADBAND CAPACITY CONSTRAINTS AND THE NEED FOR OPTIMIZATION 5 (Feb. 2010); *see also* Rysavy, *supra* note 194, at 8.

196. *See supra* Section I.A–B.

197. ODLYZKO ET AL., *supra* note 10, at 28; Wallsten, *supra* note 92.

198. GRABER, *supra* note 171, at 84.

199. Sandvine 2011, *supra* note 3, at 5; see YOO, *supra* note 24, at 97-98.

200. GRABER, *supra* note 171, at 86-100; Wallsten, *supra* note 19, at 2; but see YOO, *supra* note 24, at 99 (noting that even peak-time pricing "mimics congestion-based pricing imperfectly" and will still "result in a degree of inefficiency").

congestion by thirty percent.[201] For many years, peak pricing was a staple of long-distance and wireless telephone service in order to drive traffic toward nights and weekends when networks were less congested.[202] In broadband, a metered rate that charges customers more for peak-time use might similarly encourage customers to shift peak-time activities to less expensive off-peak hours.[203]

But it may be difficult to identify predictable periods of congestion and communicate that clearly to consumers. This may be possible for fixed broadband. Although the consensus is not universal, most analysts generally agree with the FCC that fixed broadband networks experience consistent peaks on weekdays between 7:00 p.m. and 11:00 p.m., which coincides with the time that consumers return home from work and consume bandwidth-heavy applications such as streaming video.[204] As a result, a primetime premium may be a feasible solution to alleviate future fixed broadband congestion, assuming traffic patterns do not change as network use rises. But there is much less consensus regarding wireless congestion periods. Wireless customers vary widely in their data consumption habits. Network optimization company Bytemobile notes that, with the rise of wireless video, "mobile networks are under constant strain for the majority of the day."[205] Systems can monitor network load and automatically raise prices when they detect congestion. However, unless these periods are easily understood and predicted by consumers, they are unlikely to affect consumer behavior.[206]

V. POTENTIAL ANTICOMPETITIVE EFFECTS OF USAGE-BASED PRICING

While there are many potential benefits that flow from usage-based pricing, some critics do not trust the practice because of a fear of anticompetitive harm. These commentators fear that broadband providers may adopt data caps to achieve an unfair economic advantage in the video market. They note that "in the United States Internet service providers are almost always also in the pay-television business," which competes against

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201. *See* Sam Schwartz et al., *A Comprehensive Transportation Policy for the 21st Century: A Case Study of Congestion Pricing in New York City*, 17 N.Y.U. ENVTL. L.J. 580, 596-97 (2008-2009) (discussing London and Stockholm examples); *but see* Michael H. Schuitema, Comment, *Road Pricing as a Solution to the Harms of Traffic Congestion*, 34 TRANSP. L.J. 81, 92-112 (2007) (noting distributional and other problems with congestion-based pricing of traffic).

202. *See supra* Section I.A.

203. *See* Sandvine 2011, *supra* note 3, at 5.

204. *See* FCC, *supra* note 184, at 8.

205. BYTEMOBILE, MOBILE ANALYTICS REPORT 3 (June 2011).

206. Odlyzko notes that even simple, relatively clear time-of-day pricing in other industries often fails to measurably change consumer behavior. ODLYZKO ET AL., *supra* note 10, at 28-29.

Internet-based video providers such as Netflix and Hulu.[207] Comcast estimates that the amount of data required to replace its cable service with an Internet-based competitor would be 288 gigabytes each month[208]—a figure suspiciously close to Comcast's 300-gigabyte monthly cap. Given the incentive to discriminate, critics allege that data caps serve primarily "to protect [broadband providers'] legacy, linear video distribution models from emerging online video competition."[209]

A. Data Caps as a Vertical Restraint on Trade

These are valid concerns, although they come with some caveats. For many consumers, over-the-top video providers like Netflix are complements rather than substitutes to traditional cable: they offer an alternative slate of entertainment choices but do not replicate the specific channels and programs that cable offers. Cable industry analyst James Ratcliffe explains that subscription rates remain high because "pay TV continues to provide customers with the content they want, a lot of which isn't available outside the traditional pay environment," such as live sporting events.[210] Moreover, many broadband providers (particularly DSL and wireless providers) do not deliver cable service, and not all who do (like Verizon) have adopted data caps. Nonetheless, the Commission has correctly found that vertically integrated broadband providers "have incentives to interfere with the operation of" Internet-based competitors.[211] These integrated companies wish to keep as many customers as possible enrolled in the "triple-play" bundle of voice, video, and data service, because it increases overall revenues, spreads the common costs of the

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207. *Id.* at 48.

[208] See App'ns of Comcast Corp., Gen. Electric Co., & NBC Universal, Inc. for Consent to Assign Licenses and Transfer Control of Licenses, *Opposition to Petitions to Deny and Response to Comments*, FCC MB Docket No. 10-56, at 93 (fil. July 21, 2010).

209. Letter from Free Press, *supra* note 10, at 2.

210. James Ratcliffe, *Why Cable is Winning the Cord-Cutting War*, HOLLYWOOD REPORTER (Aug. 24, 2012, 6:00 AM), http://www.hollywoodreporter.com/news/cable-TV-netflix-hulu-youtube-hbo-time-warner-362784. Of course, some of the content Ratcliffe touts can be downloaded illegally online. *See, e.g.*, Susan P. Crawford, *Team USA Deserves No Gold Medals for Internet Access*, BLOOMBERG (Aug. 5, 2012, 6:30 PM), http://www.bloomberg.com/news/2012-08-05/team-usa-deserves-no-gold-medals-for-internet-access.html (discussing file-sharing site Pirate Bay's circumvention of NBC's time-shifted Olympics coverage by hosting user-uploaded video of Olympic events). Moreover, popular cable providers such as HBO and ESPN are experimenting with web-based alternative delivery systems, and Intel seeks to enter the market as an Internet-based cable competitor, whose offerings would be a substitute for, rather than a complement to, traditional cable. *See, e.g.*, Cliff Edwards, *Intel Confident of Obtaining Programs for Web TV Service*, BLOOMBERG (June 25, 2013, 5:02 PM), http://www.bloomberg.com/news/2013-06-25/intel-confident-it-will-obtain-programs-for-internet-tv-service.html (last visited Aug. 2 2013).

211. Preserving the Open Internet: Broadband Industry Practices, *Report and Order*, FCC 10-201, 25 FCC Rcd. 17905, 17916 (2010) [hereinafter Preserving the Open Internet Report and Order].

network more widely, and can thus minimize the cost of each network service.

But regulatory intervention requires more than a showing that a vertically integrated firm has incentives to take actions that might harm competitors. The firm must also have the ability to do so. Antitrust law subjects almost all vertical restraints to the rule of reason, which makes these restraints actionable only if the firm has market power.[212] Without market power, a firm cannot maintain anticompetitive conduct, because customers will defect. If consumers in a competitive market wish to use Netflix and find that one company's data caps prevent them from doing so, those consumers will move to another broadband provider.[213] If no provider offers uncapped service and consumers demand it, over time one provider may change its policies to meet this pent-up demand.

Although analysts dispute the precise level of competition in fixed broadband markets,[214] Gregory Sidak and David Teece are probably correct that "the market for broadband access is both highly rivalrous and workably (even if not perfectly) competitive."[215] The Commission notes that eighty-two percent of American census tracts have at least two competitive options for fixed broadband service.[216] Of course, in most places this means only two options: the telephone company and the cable company. Susan Crawford notes that because of cable's recent upgrade to DOCSIS 3.0, a new standard that boosts performance of cable-based data transmission, cable companies offer speeds far greater than copper-based DSL service.[217] Alfred Kahn, the late dean of regulated utilities law, has

212. *See* Leegin Creative Leather Products, Inc. v. PSKS, Inc., 551 U.S. 877, 881 (2007). Technically, tying (which is a form of vertical inter-brand restraint) remains a per se offense, meaning a defendant can be held liable even without a finding of market power. But as Hanno Kaiser notes, this is somewhat of a distinction without a difference, as one element of a tying claim is that the defendant have market power in the tying market. *See* Hanno F. Kaiser, *Are "Closed Systems" an Antitrust Problem?* 7 COMP. POL'Y INT'L 91, 99-101 (2011).

213. *See* Einer Elhauge, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*, 123 HARV. L. REV. 397, 401 (2009) (emphasizing the appropriateness of a market power requirement in analyzing vertical restraints); *cf.* Jeffrey Jarosch, *Novel "Neutrality" Claims Against Internet Platforms: A Reasonable Framework for Initial Scrutiny*, 59 CLEV. ST. L. REV. 537, 543 (2011) (discussing role of market power in claims against closed Internet platforms such as Apple's App Store).

214. *See, e.g.*, ODLYZKO ET AL., *supra* note 10, at 32-33 (noting estimates about fixed broadband concentration and difficulty of entry).

215. J. Gregory Sidak & David J. Teece, *Innovation Spillovers and the "Dirt Road" Fallacy: The Intellectual Bankruptcy of Banning Optimal Transactions for Enhanced Delivery over the Internet*, 6 J. COMP. L. & ECON. 521, 526 (2010). Sidak and Teece cite several studies filed before the FCC in the net neutrality proceeding, including filings from Michael and one from Gary Becker and Dennis Carlton. *See id.* at 526 n.33.

216. NATIONAL BROADBAND PLAN, *supra* note 148, at 37. The Commission notes that it lacks the granularity of price and performance data needed to determine if two providers compete head-to-head throughout each census tract. *Id.*

217. Susan P. Crawford, *The Looming Cable Monopoly*, 29 YALE L. & POL'Y REV. 34, 36 (2010). Crawford notes that competition remains more robust where cable companies

explained that "[t]here is no consensus among economists about the likely sufficiency of competition under duopoly."[218] But as Sidak and Teece show, some providers experience annualized churn rates between 28.8% and 36%, which suggests that a sizeable number of customers do change broadband providers each year.[219] And providers are competing in ways that are reducing switching costs. AT&T adopted a no-term service contract option in 2008, advertising it as service "without the hassle of a term commitment like those of cable companies."[220] Most of the industry quickly followed suit. The cable industry's deployment of DOCSIS 3.0 also evinces a desire to gain a competitive edge over Verizon and AT&T, which might not have happened if the companies had market power and thus felt no need to respond to telephone-based competition.

Competition will increase as other platforms become more suitable substitutes for wireline broadband service, just as satellite rose as an intermodal competitor to traditional cable service. With the advent of 4G LTE speeds, many services available over fixed broadband networks are also available over wireless broadband as well; the gating factor is the capacity of wireless networks to offer these services at the same scale as today's cable and telephone companies. And the FCC's most recent broadband report notes that "the satellite industry began launching a new generation of satellites offering performance as much as 100 times superior to the previous generation," offering speeds that "will support many types of popular broadband services and applications."[221] This means that satellite-based broadband is, or may soon be, available throughout the country as an alternative to telephone or cable-based broadband service.

Opponents must also show that data caps harm consumers. Netflix can argue, and has argued, that data caps are a threat to its existing business model.[222] But the Supreme Court has repeatedly reminded litigants that the antitrust laws were passed for "the protection of *competition*, not *competitors*."[223] Like price discrimination, vertical restraints have ambiguous effects on consumer welfare.[224] Some vertical restraints "give rise to competitive foreclosure concerns," but most are procompetitive because they "generate significant efficiencies and enhance consumer

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compete with fiber-based telephone networks such as Verizon's FiOS service. But Verizon has no immediate plans to expand the present FiOS service footprint.

218. ALFRED E. KAHN, FTC WORKSHOP ON BROADBAND CONNECTIVITY COMPETITION POLICY (last updated Feb. 21, 2007), *available at* http://www.ftc.gov/opp/workshops/broadband/presentations/kahn.pdf.

219. Sidak & Teece, *supra* note 215, at 564-65.

220. Press Release, AT&T, Two Years, One Price, No Term Contract: AT&T Introduces New Broadband Plans with Guaranteed Monthly Rate (Aug. 20, 2008), *available at* http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26024.

221. FCC, 2013 MEASURING BROADBAND AMERICA FEBRUARY REPORT 7 (2013).

222. *See, e.g.*, Hyman, *supra* note 85. Hyman is general counsel for Netflix.

223. Brooke Group Ltd. v. Brown & Williamson Tobacco Corp., 509 U.S. 209, 224 (1993) (quoting Brown Shoe Co. v. United States, 370 U.S. 294, 320 (1962)).

224. Thomas W. Hazlett & Joshua D. Wright, *The Law and Economics of Net Neutrality*, 45 IND. L. REV. 767, 798 (2012).

welfare."[225] For example, when AT&T entered into an exclusive vertical agreement with Apple to distribute the iPhone, the wireless provider received a competitive advantage over Verizon and other competitors.[226] But this was undeniably good for consumers: it woke up a sleepy smartphone market, as AT&T advertised the product for which it paid so dearly, and Verizon began working with Google to develop the rival Android platform as a competitive alternative.

As discussed above, broadband operators can offer several procompetitive justifications for data caps. Caps allow firms to shift more network costs onto heavier users, which can expand service to light users who cannot afford the higher uniform flat rate.[227] They also encourage consumers, content providers, and broadband providers themselves to use network resources more efficiently.[228] As critics point out, caps could also deter customers from canceling cable service in favor of Internet-based video options. This is harmful to that subset of consumers who subscribe to both broadband and cable and would cancel cable but for the data cap. But it could benefit those customers who subscribe only to broadband service: because cable and broadband service share common network costs, a shrinking base of cable subscribers would force the company to recover those costs by raising broadband rates.[229] The net effect of the practice is difficult to determine with certainty, meaning that the anticompetitive case is not as simple or obvious as some critics assert.

Perhaps for this reason, several antitrust scholars have surmised that the Department of Justice is unlikely to find that data caps are anticompetitive. Harry First notes that "[a]ll these cable companies are really facing big competition from the telcos" and "[i]f the consumer can just switch, then it's not exclusionary and bad business."[230] Similarly, Herbert Hovenkamp notes that "[i]f it's simply data caps . . . that's a tougher antitrust case to make because public utilities have a legitimate interest in preventing overuse of their assets, particularly if other people's access is being limited as a result. . . . There's a legitimate claim on the part of the Internet providers that staged pricing or caps are reasonable."[231] First further explained that the agency's case likely depends on whether it can find evidence of collusion among broadband providers: "[i]f they make these decisions unilaterally about how they're going to price downloading

225. *Id.* at 797.

226. *See supra* text accompanying notes 43-44.

227. *See supra* Section II.

228. *See supra* Section III.

229. *See* George S. Ford, *A Most Egregious Act? The Impact on Consumers of Usage-Based Pricing*, *in* PHOENIX CENTER PERSPECTIVES 12-02 (May 23, 2012). Ford argues that the net effect of charging consumers who switch from cable to Internet-based video services a fee is positive.

230. Melissa Lipman, *DOJ Needs Collusion, Dominance to Make Antitrust Case*, LAW360 (June 13, 2012), http://www.law360.com/articles/349639/doj-needs-collusion-dominance-to-make-cable-antitrust-case.

231. *Id.*

from the Internet individually, that's not going to exclude these Internet rivals."[232] These comments echo the conclusions of a 2007 Federal Trade Commission study, which found that it is "difficult to find evidence that vertical controls reduce welfare" and that "optimal policy places a heavy burden on plaintiffs to show that a restraint is anticompetitive."[233]

This analysis highlights the importance of case-by-case adjudication of allegedly anticompetitive conduct. One cannot say as a general matter that data caps and other forms of usage-based pricing are inherently anticompetitive. The effect they have on competition turns upon a fact-sensitive inquiry into the broadband provider's market power, and quantification of the impact that the pricing strategy has on different segments of the provider's customer base.

B. The Xfinity-Xbox Dispute

First and Hovenkamp suggested that the Justice Department may have an easier time challenging Comcast's specific practice of exempting Xfinity app use from its data cap when watched through the Xbox video game console, while subjecting Netflix and other like services to the normally applied data cap.[234] Their conclusions stem from Attorney General Eric Holder's congressional testimony suggesting that this practice may violate a condition that the Justice Department placed on Comcast's 2011 merger with NBC Universal.[235] First wondered if the general investigation "was generated out of a concern that Comcast is violating the decree they entered into."[236]

But setting aside any special provisions attached to the Comcast merger, it is unlikely that the Xbox issue actually violates general antitrust principles. Comcast offers a service known as Xfinity On Demand, which is available for Xfinity cable subscribers to watch on television using a traditional cable box.[237] Customers who subscribe to both Xfinity cable service and Comcast broadband service may also access Xfinity On Demand using the Xfinity App on Microsoft's Xbox 360 video game console, which is connected to the television and the Internet. When a customer chooses to access Xfinity On Demand via the Xfinity App, the data used to view the service is exempt from the customer's monthly cap—

232. *Id.*

233. *See* Hazlett & Wright, *supra* note 224, at 815-16 (quoting Luke Froeb, Director, Bureau of Econ., Fed. Trade Comm'n, Presentation to European Ass'n for Research in Indus. Econ.: Economics and Antitrust: Enforcement R&D, at 23 (Sept. 2, 2005), available at http://www.ftc.gov/speeches/froeb/earie.pdf, and James C. Cooper et al., *Vertical Antitrust Policy as a Problem of Inference*, 23 INT'L J. INDUS. ORG. 639 (2005)).

234. Lipman, *supra* note 230.

235. *Id.*

236. *Id.*

237. *See* Tony Werner, *The Facts About Xfinity TV and Xbox 360: Comcast is Not Prioritizing*, COMCAST VOICES (May 15, 2012), http://blog.comcast.com/2012/ 05/the-facts-about-xfinity-tv-and-xbox-360-comcast-is-not-prioritizing.html.

even though other content viewed through the Xbox, such as Netflix, continues to count against the cap.

Although at first blush this arrangement appears discriminatory, it is hard to show any consumer harm because of the way the offer is structured. The exemption flows from Microsoft's ongoing efforts to market the Xbox as an alternative to a traditional cable set-top box. The Xfinity App is only available to customers who subscribe to Comcast's cable service, and the exemption only applies when the customer views Xfinity content on the customer's television through the Xbox. Accessing the Xfinity App on a computer or tablet would incur data use subject to the cap. Ultimately, this means only that existing Xfinity cable customers are free to use an Xbox in lieu of a traditional cable box to view cable content on their televisions. Netflix may complain that the exemption leads Comcast customers to watch Xfinity rather than Netflix content using the Xbox, because Xfinity content does not incur data charges. But importantly, a customer may already do this regardless of the exemption, simply by turning on the cable box.

From the consumer's standpoint, therefore, the exemption is merely a matter of convenience. Traditional cable consumption on television does not count toward monthly data limits, and no one seems to be suggesting that it should. The Xbox exemption merely allows customers to watch traditional cable consumption on television using the Xbox rather than a traditional set-top box as the conduit. This innovation is proconsumer, in that it gives consumers a choice of receivers for their television and perhaps allows some consumers to avoid Comcast's monthly set-top box rental fees. But the consumer is not receiving any new cap-exempt content as a result of the agreement, because the consumer already receives the same cap-exempt Xfinity programming through the cable system. Thus, while at first blush this dispute looks like an example of the potential ills of data caps, ultimately the issue does little to undermine the potential benefits of experimenting with various forms of usage-based pricing.

C. Data Caps and Market Power

The antitrust analysis of data caps in Section IV.A suggests that critics' opposition to data caps is somewhat misplaced. The real threat to consumer welfare is not usage-based pricing, but market power. After all, a firm with market power can exploit consumers whether it relies on usage-based pricing or flat-rate pricing. A broadband provider with market power that wishes to offset lost cable revenue through additional broadband revenue need not use data caps to deter or punish video cord-cutters. It could simply raise standalone flat-rate broadband prices to punish those who do not also purchase cable service. And any broadband provider lacking market power could not gouge customers under either scenario, because affected consumers would simply take their business elsewhere.

As the Commission noted, vertically integrated firms often have incentives to leverage power in one market to improve their position in another market. The Madison River investigation is a testament to this possibility. Madison River Communications paid a $15,000 fine to the Commission in 2005 to settle allegations that it blocked third-party Voice-over-Internet-Protocol ("VoIP") services from operating on its network because these VoIP services competed against Madison River's traditional telephone network.[238] Regulators should remain vigilant with regard to potentially anticompetitive conduct, but they should also heed antitrust law's lesson that many vertical restraints are procompetitive, and absent market power, consumers can punish those that are not without help from the Justice Department.

Therefore, while there are risks that usage-based pricing can become a tool for anticompetitive conduct, this does not undermine the potential benefits of allowing firms to experiment with the practice. There may be significant consumer benefits that flow from data caps and other forms of usage-based pricing. And when a pricing change adversely affects consumers, usually they can punish this behavior by switching providers. Regulatory enforcement should usually step in only if a company has wielded market power in a way that causes actual harm to consumers. As a result, any enforcement should take the form of *ex post* adjudication of specific harmful conduct, rather than *ex ante* prohibitions on pricing tools that help broadband providers improve the efficiency of the network.

VI. THE IMPORTANCE OF TRANSPARENCY

To temper the concerns addressed above, and alleviate the concerns of both critics and consumers about the introduction and use of data caps, providers should clearly communicate to the public any changes in practices. On a basic level, this transparency is mandated by the FCC's Open Internet Order. The order requires that

> a person engaged in the provision of broadband Internet access service shall publicly disclose accurate information regarding the network management practices, performance, and commercial terms of its broadband Internet access services sufficient for consumers to make informed choices regarding use of such services and for content, application, service, and device providers to develop, market, and maintain Internet offerings.[239]

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238. Madison River Commc'ns, LLC and Affiliated Cos., *Consent Decree*, DA 05-543, 20 FCC Rcd. 4295 (2005).

239. Preserving the Open Internet Report and Order, *supra* note 211, at 17937.

Clear disclosure of a firm's network management practices, including its billing practices, is an integral component of robust competition.[240] Customers can compare different broadband providers only if they have an accurate description of each firm's value proposition. Clear disclosure also puts content and application providers on notice of potential ways that these practices affect their customers' behavior, so they can adjust their business models accordingly.[241]

But disclosure of billing terms is not the only way the firm should communicate its plans to consumers. As Odlyzko notes, consumers prefer flat rates to metered rates, in part because they tend to overestimate their monthly data consumption and because of the mental transaction costs of making decisions under a metered regime.[242] Unlike minutes on a long-distance plan, megabytes are difficult units for consumers to conceptualize. But to achieve efficiency gains from usage-based pricing, a network provider must assure that its users generally understand how much data each online transaction consumes. To migrate successfully to usage-based prices without adversely affecting its reputation with customers, the provider should take steps to correct this overestimation and convince users that they are better off with usage-based pricing.

Graber suggests sending customers a bill comparing their flat-rate pricing with a hypothetical usage-based bill that shows both total use and potential savings under the new plan.[243] Providers might also circulate fliers on a regular basis noting the average amount of data consumed by popular activities, like Comcast did when it first adopted a data cap in 2008. As data consumption enters the zeitgeist, Internet content and application providers may also meet consumer demand by providing estimates of how much data individual actions might consume. Application developers in Apple's App Store and the Google Play Store routinely say how large each application is, so the consumer understands how much storage space the program will consume on the consumer's device. The market for Internet content and applications may ultimately evolve to provide similar information about consumption when possible.

Finally, providers need to make it easy for consumers to check their monthly data use. Most providers that have adopted usage-based pricing already make this information readily available to consumers through an application on the consumer's device or a web-based interface. Many also provide emails or text messages warning customers when monthly use begins to approach certain limits (such as a data cap). The prevalence of these tools shows that they are both feasible to provide and popular with consumers. Any firm considering usage-based pricing should make them available to consumers once the transition is complete.

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240. *Id.* at 17936-37.
241. *Id.*
242. ODLYZKO ET AL., *supra* note 10, at 44; *see also* GRABER, *supra* note 171, at 41.
243. GRABER, *supra* note 171, at 41.

VII. CONCLUSION

Ultimately, data caps and other pricing strategies are ways that broadband companies can distinguish themselves from one another to achieve a competitive advantage in the marketplace. When firms experiment with different business models, they can tailor services to niche audiences whose interests are inadequately satisfied by a one-size-fits-all plan. Absent anticompetitive concerns, public policy should encourage companies to experiment with different pricing models as a way to compete against one another.

As Christopher Yoo has noted, the trend toward pricing experimentation in telecommunications mirrors a greater trend toward greater experimentation and *ex post* oversight in antitrust law generally.[244] Usage-based pricing can be a useful tool for broadband providers to create differentiation in the marketplace by spreading network costs in new ways and can promote greater efficiency by consumers, content providers, and the network operator itself. Only through experimentation and empirical measurement will providers find the optimal pricing solution—which may vary from network to network. Regulators have correctly rejected the call to interfere with this pricing flexibility by imposing broadband price controls. They should continue to do so, absent a showing of market failure and consumer harm. There is no reason to believe that a one-size-fits-all pricing plan represents the only or even the best option in an increasingly diverse Internet ecosystem.

244. YOO, *supra* note 24, at 8-9; *see, e.g.*, Boliek, *supra* note 122, at 1680 ("Antitrust laws take a "wait and see" approach to new innovations and product development, and authorities will only intervene if such innovation is found to be anticompetitive ex post of deployment.").