

**INTERNATIONAL BROADBAND PRICE
COMPARISONS TELL US LITTLE ABOUT
COMPETITION AND DO NOT JUSTIFY
BROADBAND REGULATION**

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EXECUTIVE SUMMARY

A frequent claim made by those advocating for regulation of fixed broadband internet access providers is that prices in the United States are higher than those in other countries. We have been asked by NCTA – The Internet & Television Association to review fixed broadband pricing studies performed by the Organisation for Economic Co-operation and Development (OECD), Cable.co.uk, and the New America Open Technology Institute (OTI), which are often cited in support of this claim in the policy debate.

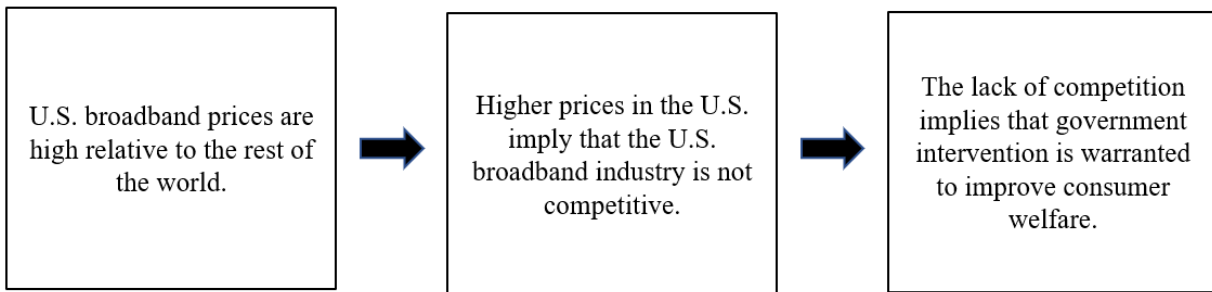
We conclude that all three studies suffer from serious methodological limitations and, in several respects, overstate U.S. prices. Thus, these studies do not support calls for the regulation of U.S. fixed broadband internet access providers or other forms of government intervention intended to address a perceived lack of competition. Specifically:

- **Although they vary in the details of their methodologies, the three studies all rely on unrepresentative samples and flawed measures of prices.**
 - In order to make valid international price comparisons, one needs a sample of prices that permits reliable inferences about population values, and none of the three studies uses a sample that does so.
 - None of the studies uses appropriate weighting schemes to calculate a single, aggregate price for each country. Without weighting for the popularity of the plans, the computed averages fail to represent the plans consumers actually purchase.
 - All of the studies fail to account for the prevalence of broadband plans that are bundled with other services and typically sold at a discount. This causes U.S. broadband prices to be overstated because significant bundle discounts are prevalent in the United States.
 - None of the studies includes prices of plans made available only to qualifying low-income consumers. From the information we have been able to review, it appears plans targeting low-income households are more frequently available in the United States than in many other countries, which means that excluding these plans from consideration likely biases the comparisons against the United States.
 - The studies do little or nothing to account for variation in broadband service quality. Because the sampled plans have widely varying qualities (e.g., download speeds), both across and within countries, price comparisons that do not properly account for quality differences are almost meaningless.
 - As a result of these flaws and others described in this paper, the reviewed studies do not provide reliable indicators of the relative attractiveness of broadband services in different countries.
- **Because they do not properly control for cost and demand differences, the studies do not provide reliable indicators of how broadband-industry performance varies across countries.** Price rankings are frequently interpreted as indicating how the broadband industries in different countries rank in terms of competitiveness or overall performance. Such interpretations are invalid, however, unless the rankings also control for how cost and demand conditions vary across countries.

- A country whose broadband supply costs are higher than those of other countries might have higher broadband service prices even if its broadband industry is more competitive than other countries' broadband industries. Because the costs of providing broadband service vary substantially across and even within countries, the treatment of costs in cross-country comparisons can make a significant difference.
 - Two of the studies make no attempt to account for cost differences, while the OTI study makes only a limited and imperfect attempt.
 - Even if one could fully control for costs, differences in national demand conditions might lead to different prices in two countries even if they were equally—but not perfectly—competitive, which further clouds the interpretation of price comparisons as reflecting relative intensities of competition.
 - The poor qualities of the studies' samples and price measures, coupled with the failure to account fully—or in two of the studies, even partially—for underlying cost and demand differences, undermine the validity of any attempt to use these cross-country price comparisons to argue that the U.S. broadband industry is less competitive than those of other countries.
- **The studies do not justify price regulation or other forms of government intervention intended to address a perceived lack of competition.**
 - As summarized above, the international price comparisons do not establish either that the U.S. broadband industry is uncompetitive or that U.S. broadband providers are performing poorly relative to the providers in other countries. Hence, these comparisons provide no justification for subjecting U.S. broadband providers to price or other regulation or for other government intervention in broadband markets.
 - Even if broadband access is insufficiently affordable for some segments of the population in the United States, it does not follow that the U.S. industry is performing in a way that regulation could improve. To the extent that broadband-access affordability is a societal objective and broadband access is unaffordable to some households because providers would have to incur particularly high costs to serve those typically rural households, or because the households fall at the bottom of the income distribution, economists generally favor addressing these concerns through subsidies targeted to high-cost-to-serve or low-income households rather than pervasive price regulation. Moreover, regulation that would cap prices in currently unserved areas is likely to undermine investment in those areas, worsening the problem rather than fixing it.
 - In addition, the affordability and attractiveness of internet services to consumers depends on several factors in addition to the price of access service. These factors include: the prices of end-user devices such as PCs and smart phones; the prices and relevance of online content; the degree of digital literacy; and concerns over privacy or security. Policies that focus on broadband access prices without considering the many other drivers of adoption and use are likely to fail.
 - **In summary, these international price comparisons contribute little to sound analysis.** Instead, reliance on these comparisons risks reaching misleading and counterproductive conclusions.

I. INTRODUCTION

1. A common line of argument for broadband access service regulation starts with international price comparisons that supposedly show that U.S. prices are significantly higher than in other parts of the world. This argument further asserts that broadband provider market power must be the cause of these higher prices, and that this market power needs to be corrected through regulation or other forms of government intervention are needed to control broadband providers' supposed market power. The argument has the following structure:



2. We have been asked by NCTA – The Internet & Television Association to review studies conducted by the Organisation for Economic Co-operation and Development (OECD), Cable.co.uk, and the New America Open Technology Institute (OTI) that are frequently cited in the current policy debate about broadband pricing, competition, and affordability, particularly by advocates for regulation.¹ To undertake this review, we first offer a general framework in which

¹ See, e.g., Kevin Taglang, “Does America Want to Invest in Broadband?,” *Benton Institute Blog*, April 9, 2021, available at <https://www.benton.org/blog/does-america-want-invest-broadband>, site accessed April 20, 2021 (indicating that the OTI Study supports the White House fact sheet’s claims that U.S. prices are high relative to other countries); Margaret Harding McGill, “Why cable hates Biden's \$100B internet plan,” *Axios*, April 2, 2021, available at <https://www.axios.com/cable-hates-bidens-internet-access-plan-e1395560-1fff-4ba3-b19e-387e545f2263.html>, site accessed April 20, 2021 (asserting that OTI finds that “Americans pay more than Europeans for internet service at comparable speeds.”); David Rosen, “How the U.S. Became an Inferior Communication Nation,” *The Progressive*, November 9, 2020, available at <https://progressive.org/dispatches/us-inferior-communication-nation-rosen-201109/>, site accessed

to evaluate the quality of price-comparison studies and determine the appropriate interpretations of their results. We then apply this framework to the three studies and conclude that they are unsound and do not support calls for government intervention in U.S. broadband markets.²

3. All three studies are highly flawed and do not offer reliable price comparisons. In particular, although they vary in their specific methodologies, the studies generally: (a) rely on samples that are neither comprehensive nor representative; (b) fail to account (either at all or fully) for the prevalence of broadband plans that are bundled with other services and typically sold at a discount; (c) do not include prices of plans made available only to qualifying low-income consumers; and (d) make apples-to-oranges comparisons that fail to account for quality differences.

4. Even if accurate price measures were available and demonstrated that U.S. prices were higher than those of other countries, higher prices do not imply a lack of competition or that industry performance is poor. One must examine the underlying causes of any price differences.

April 20, 2021 (citing Niall McCarthy, “The Cost Of Mobile Internet Around The World,” *Forbes*, March 5, 2019, available at <https://www.forbes.com/sites/niallmccarthy/2019/03/05/the-cost-of-mobile-internet-around-the-world-infographic/>, site accessed April 20, 2021 (citing data from cable.co.uk)); Adrienne Benton Furniss, “Want to solve America’s problems? Start with broadband,” *Fortune*, March 5, 2020, available at <https://fortune.com/2020/03/05/broadband-access/>, site accessed April 20, 2021 (although the article does not include a specific cite, the description of relative prices matches the OECD data.); Written Testimony of Gigi B. Sohn Before Congress of the United States, House of Representatives, Committee on Energy and Commerce, Subcommittee on Communications and Technology, January 29, 2020, available at <https://docs.house.gov/meetings/IF/IF16/20200129/110416/HHRG-116-IF16-Wstate-SohnG-20200129.pdf>, site accessed April 20, 2021 (although the testimony does not include a specific cite, the description of relative prices matches the OECD data.); Allan Holmes and Chris Zubak-Skees, “These maps show why internet is way more expensive in the US than Europe,” *The Verge*, April 1, 2015, available at <https://www.theverge.com/2015/4/1/8321437/maps-show-why-internet-is-more-expensive-us-europe-competition>, site accessed April 20, 2021 (citing OECD data).

² It should also be noted that these price comparisons shed no light on the costs and actual—as opposed to intended—effects of regulation.

For example, the costs of providing broadband service vary internationally, so prices will vary even if the degree of competition is identical in all markets, and it is entirely possible that higher-priced countries are more competitive than are lower-priced countries if there are cost differences across those countries. International price comparisons can shed light on the degree of competition only if appropriate controls for differences in costs (and other important factors affecting price) are employed.

5. Moreover, even if one concluded that the U.S. broadband industry is not fully competitive, that conclusion would not imply that regulation would improve efficiency or benefit consumers. Regulation is widely recognized to be imperfect and to generate its own costs.³ Further, the analysis underlying any decision to impose regulation should be forward looking, rather than relying on a current (or past) snapshot of industry facts. This point is important because the increased deployment of fiber by competing wireline broadband competitors and the emergence of 5G wireless broadband services as well as LEO broadband satellite services in the United States mean that broadband competition in the near future will be greater than competition today or in the recent past.

6. The remainder of this paper explains these conclusions in greater detail. Section II provides a framework for assessing the validity of the price measures used in studies that conduct international comparisons of broadband plans, and Section III applies that framework to the three studies. Section IV explores what can and cannot be learned from these studies about competition. The Conclusion summarizes the paper's findings.

³ Specifically, regulation can result in unintended adverse consequences, such as stifling innovation and investment, and distorting competition. In addition, regulation can impose substantial administrative costs on both government agencies and private firms.

II. A FRAMEWORK FOR ASSESSING THE VALIDITY OF BROADBAND PRICES USED IN INTERNATIONAL COMPARISONS

7. Broadband service is a complex, evolving product that is offered in many varieties, even within a single area, as providers respond to consumers' heterogeneous demands for service. The combination of product complexity, consumer heterogeneity, and innovation makes it essential—but difficult—to construct a price measure that accurately represents consumers' choice sets. Constructing a meaningful price measure on which to base international comparisons requires: (a) collecting a representative sample of broadband plans; (b) constructing appropriate nominal price measures; and (c) accounting for quality differences across plans. In this section, we discuss each of these requirements in turn.

A. DATA SAMPLE CHARACTERISTICS

8. Each of the international broadband price comparisons that we review in this paper samples only a subset of the plans available to consumers. The timeliness and inclusivity of the sample influence how representative it is of the plans that customers choose and thus whether it can be used to draw reliable inferences about the overall population of broadband options in the included countries. In samples containing multiple plans per country, the choice of how much weight to apply to each plan also influences whether the aggregate, country-level statistics are representative of customer choices. We discuss these factors in turn below.

1. Timeliness

9. Broadband prices can change rapidly over time. For example, in a study of the United States, Menko (2020) found that the inflation-adjusted prices of standalone broadband plans in the most popular tier of broadband service in 2015 had declined by approximately 28 percent by 2020, while speeds of those plans had increased by 16 percent, indicating an even steeper decline

in quality-adjusted prices.⁴ Similarly, Ford (2020) found that, holding quality constant, U.S. broadband prices have fallen by approximately 36 percent since 2015.⁵ It is likely that broadband prices have also fallen elsewhere in the world. Given that the rates of price and quality changes are unlikely to be the same across countries, old data can offer a misleading view of current price comparisons across countries.

2. Size

10. In many countries, there exist hundreds or even thousands of broadband plans that differ in terms of price, quality, and availability. To conduct meaningful comparisons, a study of international prices requires a representative sample of these plans. All else equal, larger samples that reflect the range of plans available to consumers will be more reliable, while samples that capture only some plans or regions within a given country risk comparing prices based on plans that are not representative of the plans sold in each country and thus do not provide a valid basis for cross-country comparisons.

3. Inclusion of Plans Sold in Bundles

11. In many instances, broadband service is sold as part of a bundle that includes other services, such as voice or video. Failure to account for the role of bundles in broadband pricing is problematic for two reasons. First, broadband sold as part of a bundle is commonly available

⁴ Arthur Menko, “2020 Broadband Pricing Index: An Analysis of Decreasing Prices and Increasing Value for Broadband Service Over Time,” *USTelecom*, September 16, 2020, available at <http://www.ustelecom.org/ustelecom-releases-2020-broadband-pricing-index-report/>, site accessed November 6, 2020, Tables 2 and 3. The study identifies the most popular standalone, residential plan for each provider in 2015 and calculates nationwide subscriber-weighted prices and download speeds. It then identifies the most similar speed plan in 2020 (regardless of popularity) and again calculates subscriber-weighted prices and download speeds.

⁵ George S. Ford, “Are Broadband Prices Declining? A Look at the FCC’s Price Survey Data,” October 26, 2020, *Phoenix Center for Advanced Legal & Economic Public Policy Studies*.

at a substantial discount to standalone prices, so that international comparisons based only on standalone prices are less relevant because they do not reflect actual prices paid by many consumers.⁶ Second, approximately 63 percent of households with a wireline broadband connection in the United States also purchase a traditional multichannel video package.⁷ As a result, analyses of the prices of standalone broadband products create a misleading view that overstates U.S. broadband prices paid by consumers.

4. Inclusion of Plans with Eligibility Restrictions

12. Certain plans are available only to customers meeting eligibility restrictions. A variety of U.S. ISPs offer low-priced plans to qualifying households. For example, Comcast offers a 50/5 Mbps plan for \$9.95/month to households eligible for a variety of public assistance programs.⁸ Approximately 280 million Americans live in areas with access to at least one low-income plan

⁶ For example, Charter offers a 14-percent discount for customers purchasing its Internet Ultra plan (\$29.99/month and with speeds up to 400 Mbps) and its TV Silver plan (\$74.99/month and with 175+ channels and free HD) in the Double Play Silver bundle, offered for \$89.98/month. Similarly, Comcast's Standard+ bundle plan includes internet with download speeds up to 200 Mbps and 130+ channels for \$79.99/month for the first 12 months, whereas its Performance Pro Internet with download speeds up to 200 Mbps is \$34.99/month and its Extra TV plan with 140+ channels is \$67.27/month, which is a bundle discount of approximately 22 percent. (Spectrum, "Spectrum Storefront," available at <https://buy.spectrum.com/buyflow/store-front>, site accessed April 21, 2021; Xfinity, "Build your package," available at <https://www.xfinity.com/learn/offers>, site accessed April 21, 2021.)

⁷ Tony Lenoir, "Broadband-Only Homes Near 30% of U.S. Households in Q2'20," *S&P Global*, August 31, 2020, available at <https://www.spglobal.com/marketintelligence/en/news-insights/blog/broadband-only-homes-near-30-of-us-households-in-q220>, site accessed April 20, 2021.

⁸ Comcast, "Internet Essentials," available at <https://www.internetessentials.com/>, site accessed April 10, 2021; Comcast, "How to Apply," available at <https://www.internetessentials.com/Apply>, site accessed April 10, 2021.

Throughout this paper, we denote broadband speeds as X/Y, where X represents the download speed in Mbps and Y represents the upload speed in Mbps.

offered by a cable company.⁹ Approximately 14 million people have participated in a low-income broadband plan offered by a cable company since 2011.¹⁰ Non-cable providers in the United States, including AT&T, also offer low-price broadband plans that are available only to low-income households.¹¹ Providers in some other countries offer plans available only to low-income households as well.¹²

13. A sample that does not include such plans will fail to be representative for those consumers who meet the eligibility requirements. Thus, a study based on such a sample will generally overstate prices and understate the affordability of broadband in the United States and other countries that have such plans. Moreover, there is some evidence that, compared to the United States, low-income plans may be less frequently available in other countries or, if available, offer smaller discounts.¹³ Thus, failure to account for low-income plans likely biases international pricing and affordability comparisons against the United States.

⁹ NCTA, “Digital Divide,” *available at* <https://www.ncta.com/positions/digital-divide>, *site accessed* April 10, 2021.

¹⁰ Information provided by NCTA.

¹¹ AT&T’s Access Program offers 25/3 Mbps service for \$10/month to qualifying low-income households and for \$45/month to non-qualifying households. (AT&T, “Access from AT&T,” *available at* <https://www.att.com/internet/access/>, *site accessed* September 22, 2020; AT&T, “AT&T Internet Services,” *available at* <https://www.att.com/internet/internet-services/>, *site accessed* December 5, 2020.)

¹² For example, British Telecom offers the BT Basic + Broadband plan, which offers unlimited broadband for £10.07/month (including voice service) to households that meet certain income eligibility requirements. (“How do I find out more about BT Basic,” *available at* <https://www.bt.com/help/landline/getting-set-up/help-people-with-impairments-or-with-particular-needs/how-do-i-find-out-more-about-bt-basic->, *site accessed* February 7, 2021.)

¹³ See “BEREC Report on Member States’ best practices to support the defining of adequate broadband internet access service,” December 6, 2019, *available at* https://berec.europa.eu/eng/document_register/subject_matter/berec/download/0/8920-berec-report-on-member-states8217-best-p_0.pdf, *site accessed* September 24, 2020, pp. 26-28 (discussing the presence of affordability measures in six (out of 27) European Union member states).

5. **Weighting for Data Samples that have Multiple Observations per Country**

14. Even if one can identify and collect representative samples of individual plans, one must use a weighting methodology to aggregate individual plan prices into a representative average price for each location in order to compare prices across locations. There are three common approaches.¹⁴

15. One is to choose a single plan. For example, one might place all of the weight on the price of the median plan, the price of the most commonly purchased plan, or the price of the cheapest available plan. Such an approach can serve as the basis of meaningful comparisons only under the highly restrictive condition that the plan chosen in each region is representative of the value consumers derive from the overall set of plans in that region. Given that there typically are multiple plans with different characteristics and prices, and that consumers have heterogeneous preferences and may differ in their access to the different plans, it is extremely unlikely that a single plan can provide an accurate picture of prices overall.

16. The second approach to weighting calculates a simple average of prices by assigning equal weight to each plan. By construction, this approach does not account for a plan's popularity with consumers and for this reason can be highly misleading. A hypothetical example illustrates this fact. Suppose there are two regions, *A* and *B*, and 99 percent of consumers in each region purchase plans with identical characteristics and each having a price of \$20 per month. The other one percent of consumers in each region purchase a second plan, which has the same characteristics in the two regions but different prices. Specifically, suppose the second plan sells for \$40 per month in region *A* and \$80 per month in region *B*. A comparison of the simple

¹⁴ Hybrid approaches also exist.

average price in region *A*, \$30 per month, with the simple average price in region *B*, \$50 month, suggests that prices are much higher and consumers are much worse off in region *B*. But, in fact, 99 percent of consumers in the two regions pay identical prices for identical service. More generally, weighting plans equally is very likely to generate misleading results for any question of policy relevance.

17. The problem is compounded when the prices being averaged have not been adjusted to account for quality differences. For instance, a very high-speed service with a large nominal price could substantially raise the simple average price despite being irrelevant to the decisions and welfare of most consumers, and despite having a much higher value to those customers who do purchase it that is not accounted for in the simple price measure. In effect, a country would be punished in such a comparison for having more high-quality broadband *options* available for customers who want such choices.

18. A third approach is to weight prices by the popularity of the underlying plans, which generates a price index that better reflects consumer preferences and, thus, might allow one to relate cross-country price differences to differences in consumer welfare. One complication of this approach is that, when comparing prices across different regions, one must decide whether to use weights based on the relative sales of plans in each region separately or to use the same weights for all regions. An example of the latter method would be to construct weights based on the consumption patterns of U.S. broadband customers and apply those weights to plans in other countries as well.¹⁵ Note, however, that such an approach is likely to make the United States

¹⁵ Because the available plans differ across countries, it is impossible to do this exactly. But one could, for example, group plans into buckets of download speeds and then apply weights at the group level.

look better than would other weighting schemes because the use of U.S. quantity weights does not reflect the fact that consumers in other countries optimize their choices based on the plans locally available.¹⁶ Another choice that must be made is whether to weight plans by their overall market shares or by their shares of recent sales.

19. The appropriate weighting approach depends on what question one is trying to answer. To assess affordability, it may make sense to focus either on the lowest-price plans (subject to certain minimum performance criteria) or on plans available to low-income consumers. By contrast, if one is comparing prices in order to develop a sense of how broadband consumer welfare compares across countries, it would be more appropriate to examine a share-weighted average of a broad sample of plans. Similarly, the choice of whether to use weights based on current or cumulative sales can depend on whether one is interested in a measure of current competition or in the average welfare of broadband consumers. In any case, it is important that there be a clear, careful discussion of how the weights used are tailored to—and appropriate for—the question of interest.

B. NOMINAL PRICE MEASURES

20. In this section, we consider how to calculate appropriate prices before adjusting for quality. To compute nominal broadband prices, one must consider: (a) what goods and services to include in the price measure; (b) how to impute a price for the broadband component of a bundle that includes other goods and services; (c) how to account for promotional pricing; and (d) how to account for the fact that broadband prices in different countries are denominated in different currencies. We consider each issue in turn.

¹⁶ This point is simply a restatement of the fact that the change in a Laspeyres price index overstates the corresponding compensating variation.

1. Fees Included in the Price Measure

21. The prices charged for broadband services frequently have several components or types of fees, all of which may affect consumer welfare and thus ideally will be included in the price measure when making international comparisons.

22. There are several components to consider including in the price of a broadband plan:

- *Monthly Service Charges:* Consumers typically pay a recurring charge for broadband service on a monthly basis.
- *Data Overage Charges:* Broadband plans may be offered with either unlimited data usage or monthly data allowances set at specified levels (e.g., one terabyte of usage each month). In the latter case, consumers may be charged an additional fee for any data they consume beyond the specified data allowance.
- *Access Equipment Charges:* Home broadband customers require hardware (e.g., modems and routers) to access internet service. Customers may either supply their own equipment or rent equipment from the broadband provider. In the latter case, customers are typically charged a monthly equipment rental fee.
- *Activation and Installation Fees:* In many cases, customers pay activation and/or installation fees to set up broadband service. These fees are typically paid only once at the outset of service. In order to incorporate these one-time fees into a comparison that includes monthly prices, they must be amortized on a monthly basis over some assumed lifetime for the subscription.

- *Other Charges:* Other connection charges may also be assessed. Failure to account for these fees will present a misleading measure of what consumers must pay to obtain service.
- *Taxes and Government Subsidies:* Governments tax and subsidize broadband services to varying degrees.

23. The appropriate set of components to include in the measure of price depends on the question being asked. For instance, if the price comparisons are used to assess industry performance, then looking at prices exclusive of taxes and government subsidies is appropriate because the taxes and subsidies are beyond the access providers' control. However, if the price comparisons are used to assess affordability, then including taxes and government subsidies in the price measure may present a more accurate picture.

24. Whatever fees are included, it is important to be consistent. For example, a monthly charge in one country that covers both the access service and a modem should not be compared with a monthly charge in another country that includes only the access service itself. Similarly, prices inclusive of taxes should not be compared to prices that exclude taxes.

2. **Imputing Prices to Bundled Components**

25. A bundled product comprises a set of multiple goods or services sold together for a single price. In general, there is no universally accepted way to allocate a bundle discount to the individual components of the bundle that applies across all uses and circumstances. A good practice for incorporating bundled components into the analysis is thus to impute prices using alternative methodologies and present multiple sets of comparisons based on those alternatives. Possible approaches include: (a) allocating the entire bundle discount to a single component identified as the "marginal" component, and (b) allocating the bundle discount to the components

proportionally to their standalone prices (i.e., applying the same percentage discount to each component's standalone price). We note that approach (a) is likely to be difficult to apply in practice given the need for detailed data on consumer demand, sales, marketing, and the terms under which the bundle is offered.

3. Accounting for Promotional Pricing

26. Broadband providers commonly offer promotional rates that last for an initial period of time, after which prices step up to a higher rate. Promotional rates may be available to new customers and/or existing customers, and whether they are received can depend on whether customers ask for them and the decisions made by the sales agents of the relevant access provider. Any comparison of international broadband prices must decide how much weight to place on promotional versus standard rates, which can affect the resulting rankings.

27. Options to account for promotional prices include: (a) treating promotions and rack rates as distinct plans and assigning weights based on market shares; and (b) treating the promotional and rack rates as parts of a single plan and computing a lifetime average price. When broadband providers offer a wide range of different promotions (in many cases in response to specific customer actions), it is extremely difficult to obtain the data necessary to calculate effective prices. Notwithstanding these difficulties, failing to account for promotions makes price comparisons across countries less reliable, particularly given that the receipt of promotional discounts is unlikely to be the same across countries or over time.

4. Accounting for Currency Differences

28. To compare prices expressed in different currencies, one must convert them into a common denomination, such as the U.S. Dollar. Two leading ways to convert local prices to a

common currency are to use: (a) market exchange rates, or (b) purchasing power parity (PPP).¹⁷ Exchange rates and PPP generally do not fully align, and the choice of how to account for currency differences can have large effects on price rankings. For example, the OECD study ranks Switzerland as having the 28th lowest fixed broadband prices out of 35 countries (i.e., approximately 77 percent of countries are cheaper than Switzerland) based on market exchange rates but only the 15th lowest prices (i.e., 40 percent of countries are cheaper) based on PPP rates.¹⁸

29. One reason to prefer the use of PPP-based exchange rates is that they better reflect the concept of affordability. Consider, for example, a bundle of goods and services one can purchase for USD 20 in the United States. It may be possible to purchase that bundle in a lower-income country using an amount of the local currency that is worth considerably less than USD 20 at current exchange rates. Using PPP instead of market exchange rates adjusts, at least partially, for such general price-level differences and may better reflect affordability and what consumption households have to tradeoff to purchase broadband.

30. Another reason to prefer using PPP-based exchange rates is that they tend to fluctuate less than market exchange rates.¹⁹ Changes in market exchange rates are often driven by factors that have nothing to do with the prices or affordability of broadband service (e.g., changes in the

¹⁷ As defined by the OECD, “[p]urchasing power parities (PPPs) are the rates of currency conversion that try to equalise the purchasing power of different currencies, by eliminating the differences in price levels between countries.” (OECD, “Purchasing power parities (PPP)”, available at <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>, site accessed November 4, 2020.)

¹⁸ OECD, “Broadband Portal,” 2017, available at <http://www.oecd.org/sti/broadband/broadband-statistics/>, site accessed November 6, 2020 (hereinafter *OECD Study*), Exhibit 4.10.

¹⁹ See, e.g., OECD, “Purchasing power parities (PPP),” available at <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>, site accessed December 18, 2020 (showing market exchange rates and PPP rates from 2000 to 2019).

interest rates paid on government-issued securities). Utilizing an exchange rate that fluctuates less will yield less noisy price comparisons. This consideration provides another reason to prefer using PPP to account for currency differences.

C. THE NEED TO ACCOUNT FOR QUALITY DIFFERENCES

31. Broadband plan quality varies along several dimensions, including the quality of the underlying service (e.g., speed, latency, and reliability) and customer-care quality. Because of differences in plan characteristics, it is important to compare quality-adjusted prices. It makes little sense, for example, to compare the price of a broadband plan offering 25/3 Mbps service to the price of a broadband plan offering 500/100 Mbps service, or to compare averages across sets of plans with significantly different mixes of qualities. However, as described in greater detail in Section III below, this is, to varying degrees, the approach that the studies of international broadband prices take.

32. Consumer welfare depends on quality-adjusted prices. Thus, to compare the value that consumers derive from broadband service, it is necessary to account for the quality of service.²⁰ A study that compares prices without making any adjustments for quality differences implicitly assumes that consumers place no value on any improvement over the minimum quality (e.g., speed) in the sample. This is an unreasonable assumption if there is significant variation in plan quality. For example, a study that compares the price of a plan offering 25 Mbps to the price of a plan offering 500 Mbps without adjusting for the difference in download speed implicitly

²⁰ Provider costs vary with the level of quality provided. On the network side, provision of speed, low latency, and reliability all require costly investment in networks. On the customer-service side, provision of high-quality customer service is also costly. As described further in Section IV below, if one is interested in understanding why nominal prices vary, it is important to understand the underlying costs of service, and studies that do not do so cannot draw meaningful inferences about industry performance from cross-country comparisons.

assumes that the customer derives no incremental value from speeds above 25 Mbps. There are three common approaches to accounting for plan quality.²¹

33. One approach is to compute price per unit of quality. For example, one could compute the price per megabit per second (Mbps) of download speed. Although this approach adjusts for speed differences, it embodies the strong assumption that the value consumers derive from a plan rises proportionally with the speed of the offering, and the available evidence indicates that consumers' valuations tend to rise less than proportionally with plan speed (e.g., consumers find a service that is ten times as fast as another to be worth less than ten times as much as the other).²² Thus, computing price per Mbps may understate the quality-adjusted prices of high-speed plans relative to those of low-speed plans and can be biased in favor of countries with high service speeds.

34. A second approach is to stratify the sample into tiers of similar plans and compare prices of plans within each tier. For example, one could compare the prices of various plans offering 25 Mbps service with one another and separately compare the prices of various plans offering 500 Mbps service with one another. This approach is likely better than not accounting for quality at all, but it still implicitly assumes that, within each tier, consumers place no value on any improvement over the minimum quality in that tier. In addition, it may be impossible to identify exactly matching plans across countries. This is especially true given the bundles of

²¹ There are also situations in which pairwise comparisons can be made even without constructing an explicit measure of quality-adjusted prices. Specifically, if prices are lower and quality is higher in Country *A* than in Country *B*, then quality-adjusted prices must be lower in Country *A* than in Country *B*. Similarly, if prices decline and quality increases over time in a single country, then quality-adjusted prices must be declining over time.

²² Aviv Nevo, John L. Turner, and Jonathan W. Williams (2016), "Usage-based pricing and demand for residential broadband," *Econometrica*, **84**(2): 411-443.

different services offered in different countries. For instance, depending on how one computes the price of the broadband component of a bundle, trying to compare bundles with video becomes nearly meaningless, particularly given the variation in channels, treatment of sports, broadcast taxes, advertising, and subsidization of networks.

35. A third approach is to use a “hedonic” regression analysis to control for product characteristics such as speed, the presence of data usage thresholds, and whether the plan is standalone or part of a bundle. Such an analysis allows one to compare residual differences in prices across countries that are not due to variation in plan characteristics. For example, one could regress broadband plan prices on measures of speed, latency, reliability, and other product characteristics. To account for potential non-linearities in the relationship between price and speed as well as in consumer preferences, the regression can incorporate a non-linear functional form. The regression results can then be used to construct a price measure for a “standardized” product across different countries, thus facilitating apples-to-apples comparisons. Although somewhat more demanding than other approaches, the hedonic approach is the one most consistent with accepted methods in economics and (properly done) is the one most likely to yield meaningful comparisons.

D. SUMMARY

36. As described above, any study that attempts to make international price comparisons must deal with several difficult issues. As a result, it is important to rely only on studies that have approached these issues carefully and consistently. Moreover, the difficulty of fully addressing these issues implies that one should interpret the results of any international price comparison with caution.

III. THE REVIEWED STUDIES RELY ON UNREPRESENTATIVE SAMPLES AND FLAWED MEASURES OF PRICES.

37. In this section, we apply the framework discussed in the previous section to evaluate the quality of the pricing data used in three international price comparison studies that feature prominently in the policy debate regarding broadband pricing, competition, and affordability:

- Organisation of Economic Cooperation and Development Broadband Statistics (2017);²³
- Cable.co.uk (2020), “The price of fixed-line broadband in 211 countries”;²⁴ and
- New America Open Technology Institute (OTI) (2020), “The Cost of Connectivity 2020.”²⁵

Below we summarize and evaluate how each study performs in terms of sample characteristics and price measures.

A. OECD STUDY

38. The Organisation of Economic Cooperation and Development (OECD) periodically publishes statistics on various fixed broadband indicators for its member states.²⁶ The most recent iteration, based on data from June 2017, finds that only one of the other 34 OECD

²³ *OECD Study*.

²⁴ cable.co.uk, “The price of fixed-line broadband in 211 countries,” 2020, *available at* <https://www.cable.co.uk/broadband/pricing/worldwide-comparison/>, *site accessed* February 6, 2021 (hereinafter *cable.co.uk Study*).

²⁵ Becky Chao and Claire Park, “The Cost of Connectivity 2020,” July 2020, *available at* newamerica.org/oti/reports/cost-connectivity-2020/, *site accessed* November 6, 2020 (hereinafter *OTI Study*).

²⁶ *OECD Study*. The OECD methodology is summarized in the following documents: OECD, “Broadband Methodology,” *available at* <https://www.oecd.org/sti/broadband/broadband-methodology.htm>, *site accessed* September 22, 2020 (hereinafter *OECD Broadband Methodology*); Working Party on Communication Infrastructures and Services Policy, OECD, “Revised OECD Telecommunication Price Baskets,” December 19, 2017, *available at* [https://www.oecd.org/sti/broadband/DSTI-CDEP-CISP\(2017\)4FINAL.pdf](https://www.oecd.org/sti/broadband/DSTI-CDEP-CISP(2017)4FINAL.pdf), *site accessed* September 22, 2020 (hereinafter *Revised OECD Telecommunication Price Baskets*).

countries had higher fixed broadband prices than the United States.²⁷ However, the study is based on out-of-date data, samples an extremely limited set of plans, excludes the prices of plans that are important to consumers, and does not account for differences in quality across countries. Hence, no credence should be given to the study’s findings, and it does not provide a reliable basis for determining appropriate broadband policy in the United States.

39. The fact that the OECD study is deficient in critical respects can be seen by considering how it addresses each of the key factors identified in Section II above:

- *Timeliness*: The OECD study relies on data from June 2017, which is now nearly four years out of date. For example, for the “High user” comparison, the OECD utilizes a Comcast plan with a base monthly price of \$54.96 offering 55 Mbps download speeds.²⁸ Today, Comcast offers a plan for \$34.99/month that provides download speeds of up to 200 Mbps.²⁹
- *Sample Size*: The OECD study reports data on fixed broadband prices for two types of users: a “low user” (“including 20 GB / month, 0.250 Mbps and above”) and a “high user” (“including 200 GB / month, 25 Mbps and above”).³⁰ Because the “low user”

²⁷ *OECD Study*, Exhibit 4.10 (using the PPP rate to convert to U.S. Dollars; a similar conclusion is reached using market exchange rates instead).

²⁸ *OECD Study*, Exhibit 4.10.

²⁹ Xfinity, “Xfinity Internet Deals,” available at <https://www.xfinity.com/learn/internet-service/deals>, site accessed April 21, 2021. This price is based on a 24-month introductory offer and includes a \$10/month discount for automatic payments and paperless billing. The OECD documentation indicates that it takes such discounts into account (*Revised OECD Telecommunication Price Baskets*, p. 3 (“Discounts shall be incorporated in the calculations of prices for each basket.”)).

³⁰ *OECD Study*, Exhibits 4.8 and 4.10.

For each customer type, the OECD collects and reports data for plans with download speeds above the threshold for the type (e.g., if the type is characterized by 25 Mbps, then the OECD

profile requires speeds substantially below those required for many common applications, we focus the discussion below on the data for the “high user” profile. Although, the OECD collects data for multiple plans, it bases its ranking for high users on only a single plan per country, greatly reducing the ranking’s reliability.³¹

- *Accounting for Bundled Discounts:* The sample does not include broadband offered as part of a bundle, thus overstating broadband prices in the United States.³²
- *Plans with Eligibility Restrictions:* The OECD sample does not incorporate plans with restricted eligibility into its analysis, including low-income plans. It therefore does not provide a sound basis to assess the affordability of plans to households meeting the eligibility requirements, and it biases results against the United States to the extent such plans are more widely available there.
- *Weighting:* Because the sample is limited to a single plan for each country in the sample, the issue of how to weight different plans is “solved” by putting all of the weight on a single plan, which greatly reduces the likelihood that the price comparisons based on this sample are informative.
- *Fees Included:* Prices include modem rental prices as well as connection charges.³³ The OECD distributes non-recurring charges over a three-year period.³⁴ As discussed in

collects data for plans offering the minimum speed greater than or equal to 25 Mbps). (*Revised OECD Telecommunication Price Baskets*, pp. 11-12.)

³¹ *OECD Study*, Exhibit 4.10.

³² See Section II.A.2 above.

³³ *OECD Study*, Exhibit 4.10; *OECD Broadband Methodology*.

³⁴ *Revised OECD Telecommunication Price Baskets*, p. 11.

Section II.B.1 above, complete and consistent treatment of such fees leads to more accurate price comparisons. The OECD appears to apply a consistent treatment of such fees.

- *Accounting for Promotional Pricing:* The OECD uses promotional discounts as long as they are “available for at least one month” and available at the time of the data collection.³⁵ The OECD distributes promotional discounts over a three-year period.³⁶ As discussed in Section II.B.3, accounting for such discounts leads to a more reliable analysis.
- *Accounting for currency differences:* The OECD reports prices converted to U.S. Dollars on the basis of both market exchange rates and PPP rates. The results are similar for some countries, but vary substantially for others.³⁷
- *Accounting for quality differences:* The OECD rankings rely on a single plan per country for the “high user” profile on which we focus. These plans have widely varying qualities. For example, the United States is represented by a Comcast plan offering 55/5 Mbps service, while Turkey is represented by 25/2 Mbps plan.³⁸ This is not an isolated example. For many countries, the study uses a plan offering download speeds of 50 Mbps or less whereas, for Iceland, the study uses a plan offering a download speed of 500 Mbps.³⁹ Because these plans vary widely in their characteristics, the raw price

³⁵ *Id.*, p. 3.

³⁶ *Id.*, p. 11.

³⁷ *OECD Study*, Exhibit 4.10. Paragraph 29 *supra* discusses one example.

³⁸ *Id.*

³⁹ *Id.*

comparisons reported in the OECD study are useless for answering most questions of interest to policymakers.

B. CABLE.CO.UK STUDY

40. In December 2020, Cable.co.uk, a UK price-comparison website, released its fourth annual international comparison of the fixed-broadband prices.⁴⁰ The study ranks 211 countries from least expensive to most expensive.⁴¹ Based on a comparison of the sample median price in each country, the study finds that the United States has the 131st cheapest broadband access.⁴² Cable.co.uk also reports the median price per Mbps and finds that the United States ranks 26th cheapest.⁴³ As we now explain, the Cable.co.uk study bases its comparisons on prices that do not adequately reflect consumer welfare, which renders its findings unreliable and means they provide no basis to impose regulation.

41. To see why the study fails to construct a price index that adequately reflects consumers' welfare, it is useful to apply the framework of Section II:

⁴⁰ *cable.co.uk Study*.

⁴¹ *Id.*

⁴² cable.co.uk, “New Global Broadband Pricing League revealed – UK broadband still poor value for money compared to rest of Europe,” Press Release December 15, 2020, *available at* [https://s3-eu-west-1.amazonaws.com/assets.cable.co.uk/global-broadband-pricing/press-release-worldwide-broadband-pricing-2020-2021-\(December\).pdf](https://s3-eu-west-1.amazonaws.com/assets.cable.co.uk/global-broadband-pricing/press-release-worldwide-broadband-pricing-2020-2021-(December).pdf), *site accessed* February 7, 2021 (hereinafter *cable.co.uk Press Release*).

⁴³ cable.co.uk, 2020- 2021–worldwide-broadband-pricing-league–table.xlsx, *available at* <https://s3-eu-west-1.amazonaws.com/assets.cable.co.uk/global-broadband-pricing/2020-2021-worldwide-broadband-pricing-league-table.xlsx>, *site accessed* February 7, 2021. The median price is labeled as “average” in the cable.co.uk data. (cable.co.uk, “Methodology: The cost of fixed-line broadband provision in 206 countries,” *available at* <https://s3-eu-west-1.amazonaws.com/assets.cable.co.uk/global-broadband-pricing/methodology%E2%80%93broadband-pricing-study-2020-2021.pdf>, *site accessed* February 7, 2021 (hereinafter *cable.co.uk Methodology*), p. 2 (“The average package price for each country is the median of all packages recorded, including any upfront or ongoing monthly costs”).)

- *Timeliness:* Cable.co.uk relies on recent data collected and analyzed from October 29, 2020 to December 8, 2020.⁴⁴ The data are thus relatively recent.
- *Sample Size:* The Cable.co.uk study analyzed 3,288 fixed-line broadband deals in 211 countries.⁴⁵ Because Cable.co.uk publishes only data aggregated to the country level, it is impossible to assess whether the plan prices in the sample are representative of overall prices.⁴⁶
- *Accounting for Bundled Discounts:* The sample generally does not include broadband offered as part of a bundle,⁴⁷ thus overstating broadband prices in the United States and other countries in which bundled discounts are offered.⁴⁸
- *Plans with Eligibility Restrictions:* The Cable.co.uk sample does not incorporate plans with restricted eligibility into its analysis, including low-income plans, which likely biases results against the United States.⁴⁹

⁴⁴ *cable.co.uk Press Release*, p. 2.

⁴⁵ *cable.co.uk Press Release*, p. 1. Cable.co.uk collected data for up to 41 plans per country. (*cable.co.uk Methodology*, p. 2.)

⁴⁶ Cable.co.uk does not provide information on the surveyed providers and geographic areas in its publicly available methodology notes, nor does it make its detailed data publicly available.

⁴⁷ *cable.co.uk Methodology*, p. 2 (“Packages that include TV subscriptions and other add-on paraphernalia have been excluded in all countries except in cases where only broadband and TV bundles are available. These are rare, but there are a few such countries scattered around the Caribbean, for example.”)

⁴⁸ See Section II.A.3 above.

⁴⁹ See Section II.A.4 above.

- *Weighting:* Cable.co.uk reports rankings based on the median price of the broadband plans that it considers.⁵⁰ Although Cable.co.uk study’s use of median prices limits the influence of outlier prices, it does not weight plans according to their popularity. The study thus bases its comparisons on prices that do not adequately account for consumer preferences and thus fail to serve as a good index for consumer welfare.
- *Fees Included:* The price includes “any upfront or ongoing monthly costs.”⁵¹
- *Accounting for Promotional Pricing:* Cable.co.uk does not provide information on whether it uses promotional or standard rates. This is a weakness of the study because, as discussed in Section II.B.3 above, accounting for such discounts leads to a more reliable analysis.
- *Accounting for currency differences:* Cable.co.uk converts prices to U.S. Dollars using the market exchange rate as of September 12, 2020.⁵² This approach suffers from the defects described in Section II.B.4 above, relative to an approach based on PPP.
- *Accounting for quality differences:* Cable.co.uk identifies all providers in each country and selects the cheapest plan offered at each available speed.⁵³ Cable.co.uk’s main ranking compares the medians of the prices of the plans it samples for each country.

⁵⁰ *cable.co.uk Methodology*, pp. 3-4. Cable.co.uk refers to their calculation as the “median average” or “average.” We interpret this to mean that they use the median because they describe their calculation as “disallow[ing] extreme outliers from skewing the final figure.” (*cable.co.uk Methodology*, p. 3.)

⁵¹ *Id.*, p. 2.

⁵² *Id.*, pp. 2-3.

⁵³ *Id.*, p. 1.

There is no reason to expect that the median plans in different countries will have similar speeds, rendering the comparison one of “apples to oranges.”

C. OTI STUDY

42. The New America Open Technology Institute’s study, “The Cost of Connectivity 2020,” reports international comparisons of fixed broadband prices and asserts that “U.S. consumers pay the highest average costs out of any region in our dataset.”⁵⁴ The study also calculates price per Mbps in advertised download speed and finds that the U.S. prices are lower than those in the rest of North America and Europe, but higher than those of Asia.⁵⁵ Because it is based on outdated data, excludes the prices of plans that are important to consumers, excludes various fees such as installation and equipment fees, and does not fully account for differences in quality, the study presents a misleading picture of U.S. broadband prices, both in absolute terms and relative to broadband prices in other countries. As such, it provides no reason to conclude that there is a problem, much less one that requires regulation.

43. The OTI study’s measure of prices is flawed in terms of almost every factor identified in the framework described above in Section II :

- *Timeliness*: OTI relies on data collected between June 2019 and March 2020. Although these data are relatively recent, even these data are already outdated. For example, the report cites a Comcast plan offering 150/5 Mbps service in Washington DC for \$39.99/month. But Comcast upgraded its 150 Mbps plan to 200 Mbps (download) in 2019.⁵⁶

⁵⁴ *OTI Study*, p. 29.

⁵⁵ *Id.*, p. 36.

⁵⁶ Information provided by Comcast.

- *Sample Size:* The study collects data on advertised prices and advertised speeds for 760 plans in 28 cities across Asia (3 cities), Europe (9 cities), and North America (16 cities, of which 14 are in the United States). The small number of cities raises strong doubts about the representativeness of the sample.
- *Accounting for Bundled Discounts:* The sample does not include broadband offered as part of a bundle,⁵⁷ thus overstating broadband prices in the United States.⁵⁸
- *Plans with Eligibility Restrictions:* The OTI sample does not include plans with restricted eligibility, such as low-income plans,⁵⁹ which likely biases results against the United States.⁶⁰
- *Weighting:* The OTI study presents both average and median prices but focuses on average prices. In particular, OTI reports the simple average and median prices for each city.⁶¹ OTI also reports the simple average price for all plans offering at least 25/3 Mbps service, all plans offering at least 100 Mbps download speeds, all plans offering at least 100/100 Mbps service, all plans offering at least 1000 Mbps download speeds, and all plans offering at least 1000/1000 Mbps service.⁶² Because of its focus on simple averages, the OTI study's results are not representative of the pricing of the plans consumers actually choose, making the comparisons less informative.

⁵⁷ *OTI Study*, p. 9.

⁵⁸ See Section II.A.2 above.

⁵⁹ *OTI Study*, p. 17.

⁶⁰ See Section II.A.4 above.

⁶¹ See, e.g., *OTI Study*, p. 30.

⁶² *Id.*, pp. 39-43.

- *Fees Included:* OTI collects data on monthly service fees as well as, at least in some instances, installation and activation fees, equipment fees, data usage thresholds and data overage penalties, and contract terms and early termination fees.⁶³ However, the OTI study has incomplete fee data. For example, subscribers to the government-operated network in Ammon, Idaho, must pay a \$3,200-\$3,600 fiber connection fee and an additional \$16.50 per month in fees to the city.⁶⁴ In its price comparisons, the OTI study does not account for these fees and, thus, understates what consumers pay to obtain access services from this provider.
- *Accounting for Promotional Pricing:* OTI collected data on both promotional and standard rates. Its primary analysis relies on promotional rates, where available.⁶⁵
- *Accounting for currency differences:* The OTI study converts currencies to U.S. Dollars using the PPP rate.⁶⁶
- *Accounting for quality differences:* As described above, the OTI study reports simple average prices for all plans meeting several different minimum-speed thresholds.⁶⁷ It also reports the simple average price per Mbps.⁶⁸ Because it uses simple averages, even when it applies minimum performance thresholds, OTI applies equal weight to plans

⁶³ *Id.*, p. 18.

⁶⁴ City of Ammon Fiber Optics, “FAQs,” *available at* <https://www.ammonfiber.com/faq.html>, *site accessed* April 3, 2021.

⁶⁵ *OTI Study*, p. 19.

⁶⁶ *Id.*, p. 17.

⁶⁷ *Id.*, pp. 39-43.

⁶⁸ *Id.*, p. 35.

having widely varying performance characteristics and very different degrees of consumer adoption. This approach leads to misleading estimates of service prices. For Washington, D.C., for example, the OTI study finds an average advertised monthly price of \$70.72 across 17 plans.⁶⁹ The advertised prices on these plans range from \$19.99/month for an RCN plan that offers 10/4 Mbps service to \$299.95/month for Comcast's Gig Pro plan that offers 2000/2000 Mbps service. By using a simple average, the study gives equal weight to Comcast's 150/5 Mbps plan for \$39.99/month and Comcast's 2000/2000 Mbps plan for \$299.95/month despite the fact that the former has many subscribers and the latter has very few.⁷⁰ Inclusion of Comcast's Gig Pro plan in the calculations, without accounting for the plan's very low number of subscribers, substantially distorts the calculated average both because the plan offers a very different speed than other plans in the average and because it attracts very few customers: Dropping the \$299.95/month plan from the calculation would decrease the average price in Washington, D.C. by approximately 20 percent, from \$70.72/month to \$56.39/month. In short, a simple average price across such different plans is almost meaningless and cannot be used to make valid comparisons of average prices across cities where the plans offered are quite different. Effectively, Washington D.C. is being penalized in the rankings because consumers have the *option* to buy a high-quality, high-price plan.

⁶⁹ *Id.*, p. 30.

⁷⁰ Subscription information provided by Comcast.

IV. THE STUDIES DO NOT PROVIDE RELIABLE INDICATORS OF HOW BROADBAND INDUSTRY PERFORMANCE COMPARES ACROSS COUNTRIES.

44. For the reasons described above and additional reasons identified below, we conclude that the international price comparisons in the three studies that we reviewed contribute very little to understanding the state of broadband industry performance in the United States. Moreover, it is difficult to draw reliable inferences about performance from *any* international comparison of broadband prices. To the extent studies are implemented to assess market performance, careful econometrics studies of U.S. markets are likely to be more fruitful than international price comparisons.

45. Even if accurate price measures were available and demonstrated that U.S. prices were higher than those of other countries, higher prices do not imply a lack of competition or that the industry is performing poorly. In addition to differences in competition, differences in costs or demand characteristics can lead prices to vary across countries. It follows that, in order to make a valid comparison of industry performance levels, one must account for any differences in the costs that broadband providers must bear to supply service. For example, prices in a market with little competition but low underlying costs might well be lower than prices in a market with substantial competition but high underlying costs. From a competition perspective, however, the former cannot be said to be performing better than the latter. And, to the extent that the public policy objective is to incentivize affordable service with broad coverage, whether prices are high because competition is weak or because costs are high has important implications for appropriate policy. Demand shifts can also affect equilibrium prices. But the interpretation of those shifts can be very complex, and it can be very difficult to isolate changes in demand from changes in

competition. This complexity and difficulty constitute another reason that cross-country comparisons are unlikely to be useful.⁷¹

46. Returning to the need to account for costs, both engineering principles and industry data indicate that costs vary widely across countries.⁷² International price comparisons thus can shed light on industry performance only if one adequately controls for differences in costs. Empirical economic literature recognizes the importance of controlling for costs in studying price variation, as well as the serious challenges in doing so well, and has developed methods to do so reliably.⁷³ None of the studies we reviewed comes close to the level of rigor required to generate reliable comparisons of industry performance.

47. When accounting for costs in measures of industry performance, it can be useful to consider both marginal and average costs. *Marginal costs* are those costs that providers incur when adding incremental customers (e.g., the cost of connecting an additional home to an existing network, the shadow cost of additional traffic on the network, and customer care costs). Because a profit-maximizing firm generally operates at a level where its marginal revenue is

⁷¹ Indeed, the OECD recognizes that a wide range of factors drive prices, and it warns against over-reliance on broadband pricing comparisons to help guide policy decisions:

All statistical country comparisons should be undertaken with caution and this advice similarly applies to broadband statistics. There is a breadth of market, regulatory and geographic factors which help determine penetration rates, prices, and speeds. Therefore, it is important that policy makers examine a wide range of broadband indicators when considering key policy decisions.

(*OECD Broadband Methodology*.)

⁷² For example, the OECD has estimated that fiber deployment costs approximately \$110-170 per home passed in South Korea compared to approximately \$1,000-1,300 per home passed in Australia. (OECD, “The Development of Fixed Broadband Networks,” June 13, 2014, OECD Digital Economy Papers, No. 239, OECD Publishing, Paris, *available at* <http://dx.doi.org/10.1787/5jz2m5mlb1q2-en>, *site accessed* November 6, 2020, p. 8.)

⁷³ Timothy F. Bresnahan (1989), “Empirical Studies of Industries with Market Power,” *Handbook of Industrial Organization*, Eds. Richard Schmalensee and Robert D. Willig, Elsevier Science Publishers B.V., Chapter 17.

equal to its marginal costs, marginal costs are important drivers of pricing. *Average costs* are equal to total costs divided by the quantity of output sold. To remain viable, a firm must charge a price (which equals its average revenue) at least as large as its average cost.

48. Whether using a measure based on marginal or average costs, accurately accounting for costs is challenging and any measure of cost is likely to be imperfect. Two of the studies we reviewed—those by the OECD and Cable.co.uk—do not attempt to control for underlying costs at all and thus do not grapple with this challenge. The OTI study makes a limited attempt to control for costs by adopting an approach under which important drivers of average or marginal costs are identified and prices are compared only among data points having similar values of those cost drivers. In particular, although its main headline is based on a comparison of prices with no controls for costs, in some of its analyses, the OTI study also compares cities that fall within the same population-density bucket, where the buckets have increments of 1,000 people per square kilometer, up to 10,000 people per square kilometer, and an additional bucket for cities with population densities exceeding 10,000 people per square kilometer.⁷⁴

49. The OTI study’s results demonstrate controlling for costs, even in a limited way, can significantly alter results. When it makes no attempt to control for costs, the OTI study finds that advertised prices are highest in the United States.⁷⁵ By contrast, when it controls for both download speed and population density, the OTI study finds that “U.S. providers on average advertise similar prices for similar speeds as European providers.”⁷⁶

⁷⁴ *OTI Study*, p. 32.

⁷⁵ *Id.*, pp. 29-32.

⁷⁶ *Id.*, p. 38.

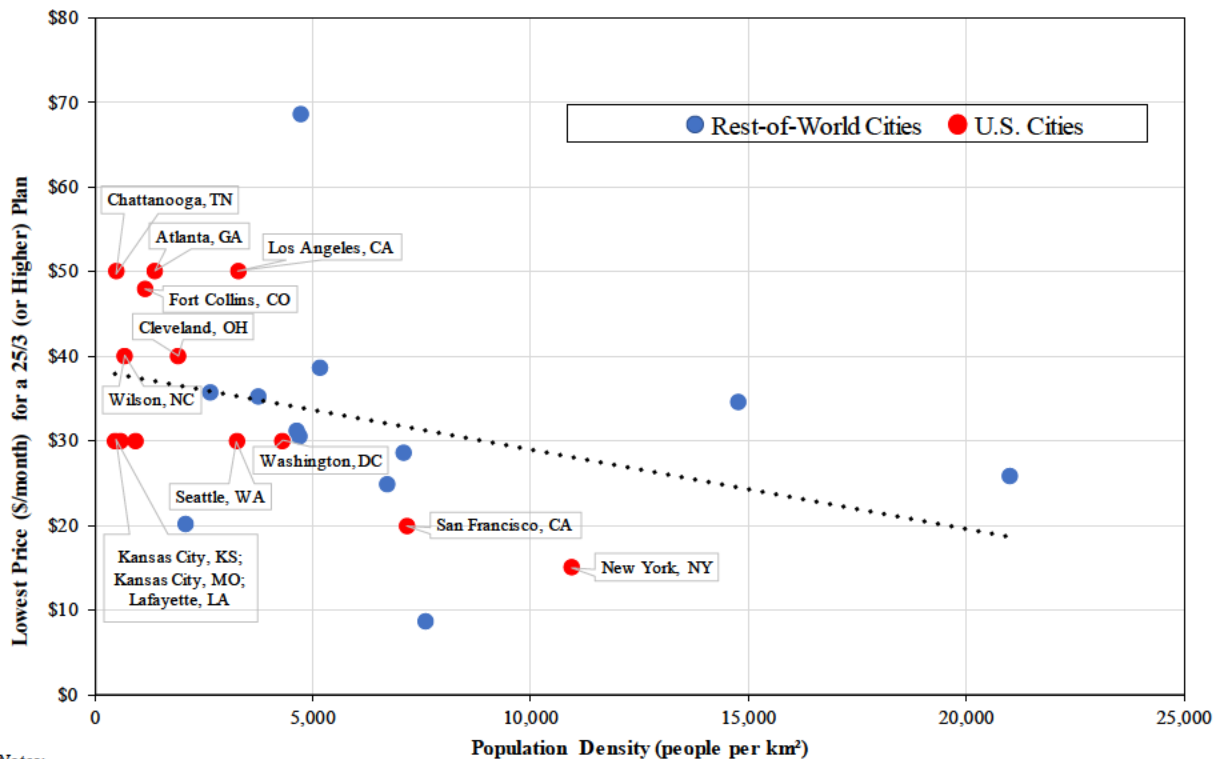
50. The importance of controlling for costs can be seen in greater depth by examining the OTI study further. As can be seen from Figure 1 below, which is derived from the data underlying the OTI study, if one simply compares prices and does nothing to account for population density, then broadband providers in U.S. cities generally appear to be performing worse than providers in non-U.S. cities.⁷⁷ However, as can also be seen from Figure 1, the OTI sample includes several U.S. cities that have lower population densities than any of the cities in the rest of the world. This is an important difference because population density is a key driver of network costs.⁷⁸ In areas with less-dense populations, the number of households served per mile of deployed fiber or hybrid fiber-coaxial cable is lower, which increases the capital costs per household served. It thus is important to take density into account when using broadband prices as a measure of industry performance.

51. As Figure 1 shows, prices for plans offering 25/3 Mbps or higher broadband speeds in U.S. cities (represented by red dots) are generally similar to or below prices for comparable plans in non-U.S. cities (represented by blue dots) with similar population density. This conclusion holds especially in larger U.S. cities such as Washington, DC, San Francisco, CA, and New York, NY.

⁷⁷ These comparisons are based on the cheapest plan in each city that meets the minimum speed threshold. In contrast to using average prices, this approach places all of the weight on the cheapest plan (satisfying the minimum speed threshold) rather than equal weight on all plans no matter how expensive. The cheapest plan reflects the best price a consumer could obtain, subject to attaining at least the desired speed.

⁷⁸ For example, the OTI Study states that “[a] given area’s population density affects the potential per-consumer return on internet infrastructure implementation costs, and can therefore be an important variable that impacts internet speeds and prices.” (*OTI Study*, p. 19.)

Figure 1: Lowest Prices for Broadband with 25/3 Mbps Speeds (or Higher)



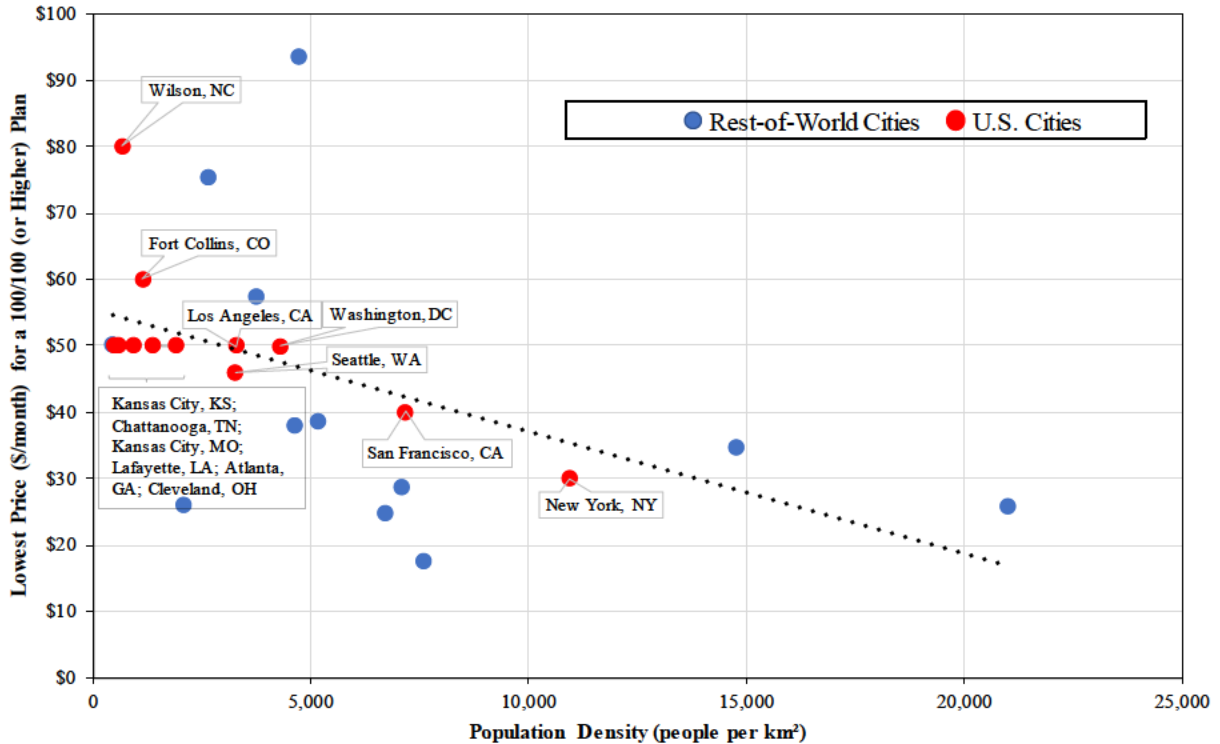
Notes:

- [1] Prices represent promotional prices when available and if the duration of the promotion is at least 12 months
 - [2] Only plans with no data caps or caps greater than 1 GB are included
 - [3] Seoul and Mexico City are excluded because upload speeds are not recorded for their plans
 - [4] Ammon, ID excluded because the OTI Study price data does not factor in the full price of broadband (e.g., it excludes monthly fees associated with installation and maintenance) provided over the municipal network in Ammon, ID
- Source: OTI Study (backup materials)

52. Similarly, Figure 2 below shows that U.S. prices for plans in the OTI study’s sample offering at least 100/100 Mbps speeds are not particularly high compared to prices in cities in other countries using a simple prediction based on cost factors (where costs are proxied by population density).⁷⁹

⁷⁹ Again, we focus on the least expensive plan in each city meeting the minimum speed threshold. We illustrate the point using 100/100 Mbps plans because this is one of the categories that the OTI study considers. (OTI Study, p. 41.)

Figure 2: Lowest Prices for Broadband with 100/100 Mbps Speeds (or Higher)



Notes:

- [1] Prices represent promotional prices when available and if the duration of the promotion is at least 12 months
- [2] Only plans with no data caps or caps greater than 1 GB are included
- [3] Seoul and Mexico City are excluded because upload speeds are not recorded for their plans
- [4] Ammon, ID excluded because the OTI Study price data does not factor in the full price of broadband (e.g., it excludes monthly fees associated with installation and maintenance) provided over the municipal network in Ammon, ID

Source: OTI Study (backup materials)

53. Although the OTI study’s results establish that it matters if one controls for costs, there are several problems with the OTI study’s approach. One is that a simple measure of density is unlikely to be sufficient to capture differences in density that drive cost differences. Consider, for example, two geographic areas with identical total area and population (and hence identical average population density). In one, suppose that the population is massed in a small portion of the total area (e.g., a central city) with a few smaller population clusters. In the other area, suppose that the population is uniformly distributed over the entire geographic area. The costs associated with deploying broadband in the first area are likely to be much lower than the costs

of deploying broadband in the second area. Thus, data on average density in each area would not fully capture the relevant costs.

54. Another problem with the OTI study’s approach to controlling for costs is that, in assessing whether prices are high or low relative to costs, it is important to utilize cost estimates for the appropriate customer set (e.g., geographic region). Broadband prices reflect costs aggregated up to the geographic level at which broadband providers set prices. If broadband providers set prices nationally, then national cost measures (e.g., national density) may be appropriate. Conversely, if broadband providers set prices at the city level, then city-level cost measures are appropriate when costs vary significantly among different cities within a given country. The OTI study contains no discussion of the appropriate level at which to calculate population density.⁸⁰

55. Another problem with the OTI study is that it omits several other factors that also affect the costs of service. The omission of the costs of obtaining access to rights of way and the labor required to deploy network infrastructure are particularly important cost drivers that the OTI study omits. A study by the U.S. Department of Transportation found that “90 percent of the cost of deploying broadband is when the work requires significant excavation of the roadway.”⁸¹

⁸⁰ Although we have discussed this issue in the particular context of population density, it arises with respect to cost drivers generally. It is a difficult issue to address because, in practice, the geographic zones over which broadband providers set prices likely vary across both providers and countries and generally are not publicly known.

⁸¹ The Council of State Governments, “The Current State,” July-August 2017, *available at* https://www.csg.org/pubs/capitolideas/enews/cs41_1.aspx, *site accessed* November 6, 2020; Federal Highway Administration, Office of Transportation Policy Studies, “Minimizing Excavation Through Coordination,” Policy Brief, October 2013, *available at* https://www.fhwa.dot.gov/policy/otps/policy_brief_dig_once.pdf, *site accessed* November 6, 2020.

Similarly, a recent study by the European Commission found that “[c]ivil engineering works, such as the digging-up of roads to lay down high-speed broadband, account for up to 80% of the cost of deploying high-speed networks.”⁸² Notably, labor and access costs may vary widely both across and within countries.⁸³

56. The degree to which governments subsidize broadband costs also affects providers’ private costs. There is wide variation in the focus and amount of public funding for broadband network investment in the United States and other countries. In the United States, public funding generally focuses on network coverage, especially in rural areas that are costly to serve and have low returns on investment.⁸⁴ In comparison, Asian countries such as Japan and South Korea have subsidized the deployment of next-generation fiber networks.⁸⁵ Broadband subsidies may be higher in other countries than they are in the United States, and—to the extent this pattern holds—studies that fail to account for these differences will tend to understate the private costs

⁸² European Commission, “EU rules to reduce cost of high-speed broadband deployment,” September 29, 2020, *available at* <https://ec.europa.eu/digital-single-market/en/cost-reduction-measures>, *site accessed* November 6, 2020.

⁸³ For example, per-capita GDP is commonly used as a proxy for labor costs, and per-capita GDP varies widely across countries even within the OECD. (See “A Study on Cost-Benefit Analysis of Fibre-Optic Co-Deployment with the Asian Highway Connectivity,” Asia-Pacific Information Superhighway (AP-IS) Working Paper Series, April 2018, *available at* <https://www.unescap.org/sites/default/files/Cost-benefit%20analysis%20of%20fOC%20with%20Asian%20Highway.pdf>, *site accessed* May 5, 2021; OECD, “Gross domestic product (GDP),” *available at* <https://data.oecd.org/gdp/gross-domestic-product-gdp.htm>, *site accessed* May 5, 2021.)

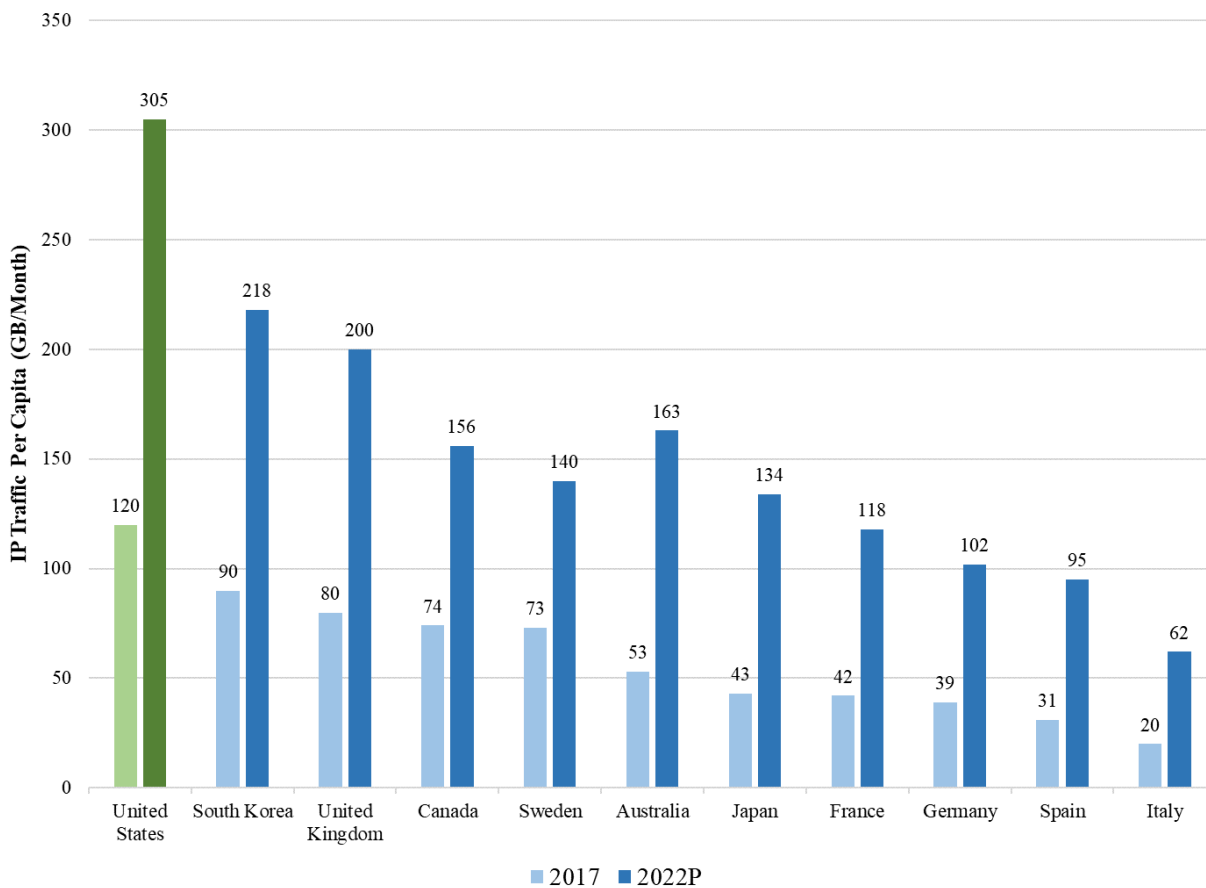
⁸⁴ See, e.g., The White House, “American Jobs Plan: The American Jobs Plan Advances Racial Equity,” *available at* <https://www.whitehouse.gov/wp-content/uploads/2021/04/AJP-Racial-Equity-Fact-Sheet-FINAL.pdf>, *site accessed* April 13, 2021 (“The President’s plan will prioritize building “future proof” broadband infrastructure in unserved and underserved areas so that we finally reach 100% high-speed broadband coverage.”).

⁸⁵ Wolfgang Briglauer and Klaus Gugler (2013), “The Deployment and Penetration of High-Speed Fiber Networks and Services: Why are EU Member States Lagging Behind?,” *Telecommunications Policy*, 37: 819-835, Table 3 and pp. 828-829 (“From Table 3, we first infer that within the cluster of Asian frontrunners, massive public subsidies are already determined and in place (KR, JP, TW, but also SG).”).

faced by U.S. broadband providers relative to those faced by providers in other countries, thus biasing international comparisons against the United States for purposes of drawing inferences about competition and industry performance.

57. The intensity with which customers consume broadband services is another factor that affects costs. More intense usage triggers the need for service providers to undertake costly expansion of network capacity to handle additional traffic while continuing to meet quality-of-service standards. U.S. broadband customers consume large amounts of data relative to customers in many other countries. Indeed, as shown in Figure 3 below, the United States leads other industrialized nations in IP traffic per capita. IP traffic per capita in the United States is projected to be approximately 40 percent greater than the next-highest-traffic country in the analysis by 2022. Cross-country comparisons that do not account for differences in data consumption therefore miss an important component of provider costs and are very likely to be biased against the United States. Although the endogeneity of usage can make it difficult to properly control for, this difficulty does not change the fact that a study that fails to control for usage does not generate reliable results. For that reason, this difficulty is an argument against using international comparisons to draw inferences about intensity of competition.

Figure 3: IP Traffic Per Capita⁸⁶



58. In general, it is difficult or impossible to account for the full set of costs relevant to broadband pricing. Critically, there is no reason to believe that the inclusion of additional—but incomplete—control variables necessarily generates a more accurate measure of industry performance. Depending on what the particular added explanatory variables capture, the new residual might be more or less close to the true measure of industry performance that the ranking is meant to reflect. For example, the inclusion of an additional explanatory variable meant to account for demand might also be correlated with competitive conditions (e.g., greater consumer

⁸⁶ USTelecom, “USTelecom Industry Metrics & Trends 2020,” April 2020, *available at* <https://www.ustelecom.org/research/ustelecom-industry-metrics-and-trends-2020-update/>, *site accessed* April 20, 2021, slide 30.

demand might attract additional entry). As a result, the inclusion of this variable might make the residual even less informative about the state of competition; the controls might “take out” more of the competition effect than the cost or demand effect from the residual, leaving the residual less informative about industry performance. With general economic controls, which are likely correlated with cost, demand, and competitive conditions, there is simply no way to know that the controls help, while it is certain that the controls do not fully solve the problem.

59. In summary, the relative performance of broadband industries in different countries cannot reliably be inferred from naïve price comparisons even if—unlike the three studies we examined—those price comparisons are based on properly constructed price indices. To make valid international comparisons, one must properly account for cost differences, a difficult challenge that none of these three studies meets.

60. The challenges associated with measuring relative industry performance using price comparisons of the sort described above (or using reduced-form pricing regressions) are well understood in the economics literature. For example, Bresnahan (1989) writes:⁸⁷

Individual industries are taken to have important idiosyncracies. It is likely that institutional detail at the industry level will affect firms' conduct, and even more likely that it will affect the analyst's measurement strategy. Thus, practitioners in this literature are skeptical of using the comparative statics of variations across industries or markets as revealing anything, except when the markets are closely related.

Although Bresnahan was writing in the context of comparisons across industries, a similar point applies to comparisons of the same industry across countries. An alternative to cross-market

⁸⁷ Timothy F. Bresnahan (1989), “Empirical Studies of Industries with Market Power,” *Handbook of Industrial Organization*, Eds. Richard Schmalensee and Robert D. Willig, Elsevier Science Publishers B.V., Chapter 17., p. 1012.

comparisons is to develop a single-industry (single-country) study that relies on economic theory to generate refutable hypotheses about the conduct of the industry. Indeed, this alternative has been the predominant approach of empirical industrial organization for the last 30 years.⁸⁸ In other words, the international comparison studies that we reviewed are out of step with modern empirical industrial organization economics.

V. CONCLUSION

61. Our analysis establishes that three commonly cited studies by cable.co.uk, OECD, and OTI comparing international broadband-access prices contain fundamental flaws and do not offer reliable indicators of the relative attractiveness to consumers of the broadband plans available in different countries. Moreover, in several respects, the studies overstate U.S. prices and may be biased against the United States.

62. The use of these price comparisons to assess the *competitive performance* of the U.S. broadband industry suffers from additional flaws—most notably, the failure of the studies to account for underlying differences in the costs of providing broadband access. Hence, these studies do not provide a sound basis on which to conclude that the U.S. broadband industry is uncompetitive or that price regulation or other forms of government intervention intended to address a perceived lack of competition would benefit consumers. If one is going to assess the

⁸⁸ See, e.g., Liran Einav and Jonathan Levin (2010), “Empirical Industrial Organization: A Progress Report,” *Journal of Economic Perspectives*, 24(2): 145-162, p. 147 (“Today, most of the influential research in empirical industrial organization looks extensively to economic theory for guidance, especially in modeling firm behavior. Studies frequently focus on a single industry or market, with careful attention paid to the institutional specifics, measurement of key variables, and econometric identification issues.”).

state of competition, one should conduct careful economic studies of broadband markets within the United States rather than make claims based on unsound international price comparisons.

63. Similarly, instead of simply asserting that broadband adoption is too low in the United States because U.S. broadband prices are allegedly high relative to the rest of the world, we recommend a focus on understanding the obstacles to broadband adoption in the United States. For example, the affordability and attractiveness of internet services to consumers depends on several factors in addition to the price of access service. These factors include: the prices of complementary goods (e.g. end-user devices such as PCs, tablets, and smart phones) and services (e.g., content);⁸⁹ the degree of interest in using the internet; the ability to use the internet somewhere other than home; the degree of digital literacy; and concerns over privacy or security.⁹⁰ Policies that focusing on broadband access prices without considering the many other

⁸⁹ This conclusion follows from the fact that households do not consume broadband internet access for its own sake—access service is one of several components that together allow households to consume internet content and use the internet to communicate with others.

⁹⁰ Data from the National Telecommunications and Information Administration (NTIA) show that, between 2013 and 2019, the portion of respondents pointing to cost as the main reason for not adopting broadband at home declined from 28 percent to 19 percent while the portion responding with “Don’t Need or Not Interested” rose from 47 percent to 60 percent. Whitacre and Rhinesmith (2016) found that the lack of need for broadband, the ability to access broadband elsewhere, the inadequacy of complementary products such as computers, and privacy concerns were all reasons for non-adoption of broadband. Carare *et al.* (2015) found that two-thirds of the households in their survey would not subscribe to broadband *at any price*, and results from the FCC’s Lifeline broadband experiments, discussed in Wallsten (2016), indicate that ISPs struggled to sign up customers even when offering deeply subsidized prices to low-income households that did not have broadband already. (NTIA Data Explorer, June 10, 2020, *available at* <https://www.ntia.doc.gov/data/digital-nation-data-explorer#sel=noNeedInterestMainReason&disp=map>, *site accessed* December 5, 2020; Brian Whitacre and Colin Rhinesmith (2016), “Broadband un-adopters,” *Telecommunications Policy*, 40: 1-13; Octavian Carare, Chris McGovern, Raquel Noriega, and Jay Schwarz (2015), “The willingness to pay for broadband of non-adopters in the U.S.: Estimates from a multi-state survey,” *Information Economics and Policy*, 30: 19-35; Scott Wallsten (2016), “Response to National Science Foundation/National Telecommunications and Information Administration ‘Request for Comments [on a] National Broadband Research Agenda,’” *Technology Policy Institute*, p. 2.)

drivers of adoption and use are likely to fail. Given the complex set of factors involved, developing such an understanding requires conducting careful studies of: (a) the pricing, quality, and availability of broadband end-user devices and relevant content, as well as broadband-access services; and (b) consumer behavior and attitudes. These studies should also be sensitive to differences across different demographic groups and locations.

64. In summary, existing international price comparisons may generate provocative headlines, but these comparisons contribute little to sound analysis of whether broadband providers should be subject to regulation and do not support a conclusion that high broadband prices in the United States are responsible for the digital divide. Indeed, reliance on these comparisons risks reaching misleading and counterproductive conclusions.