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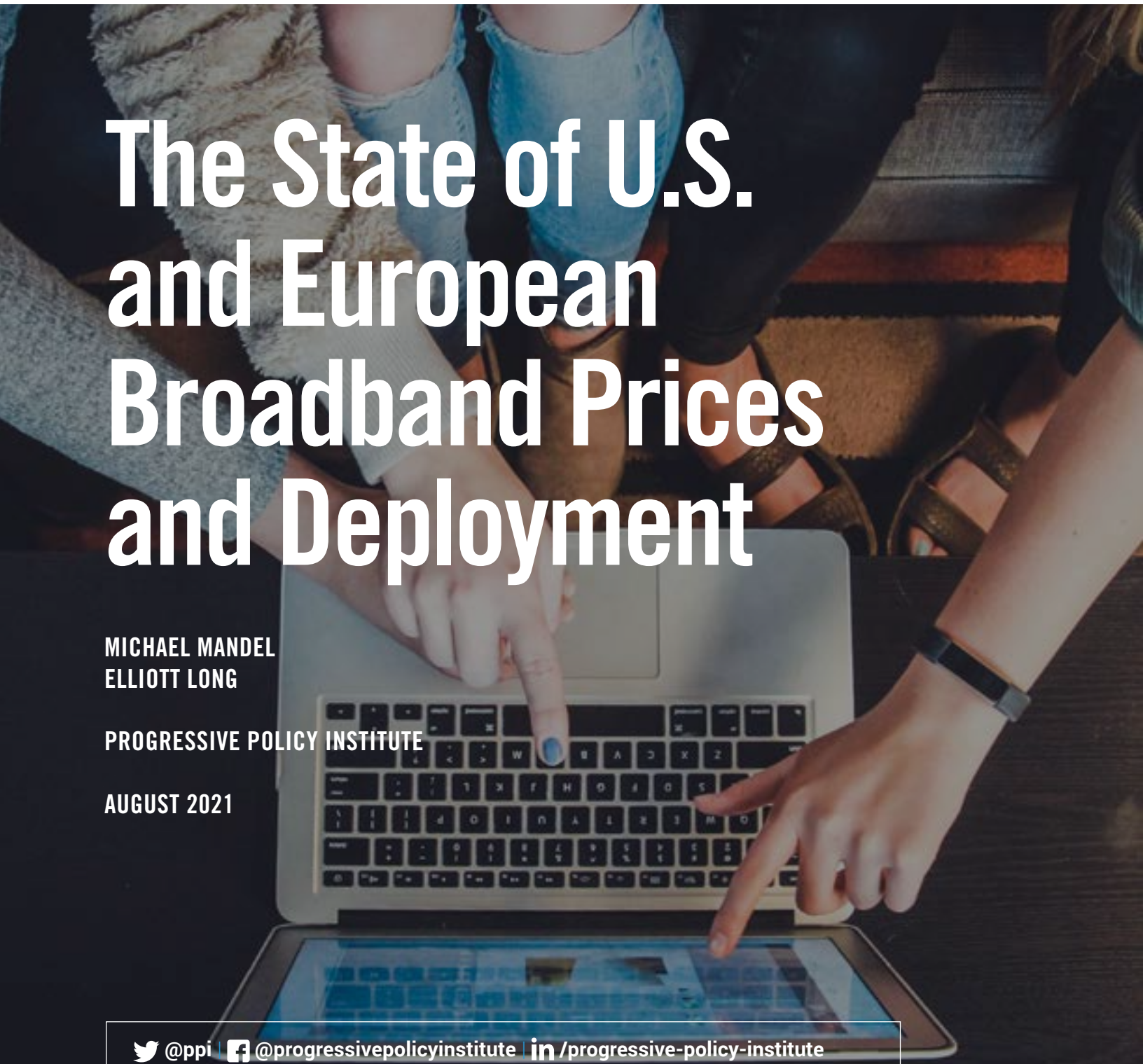

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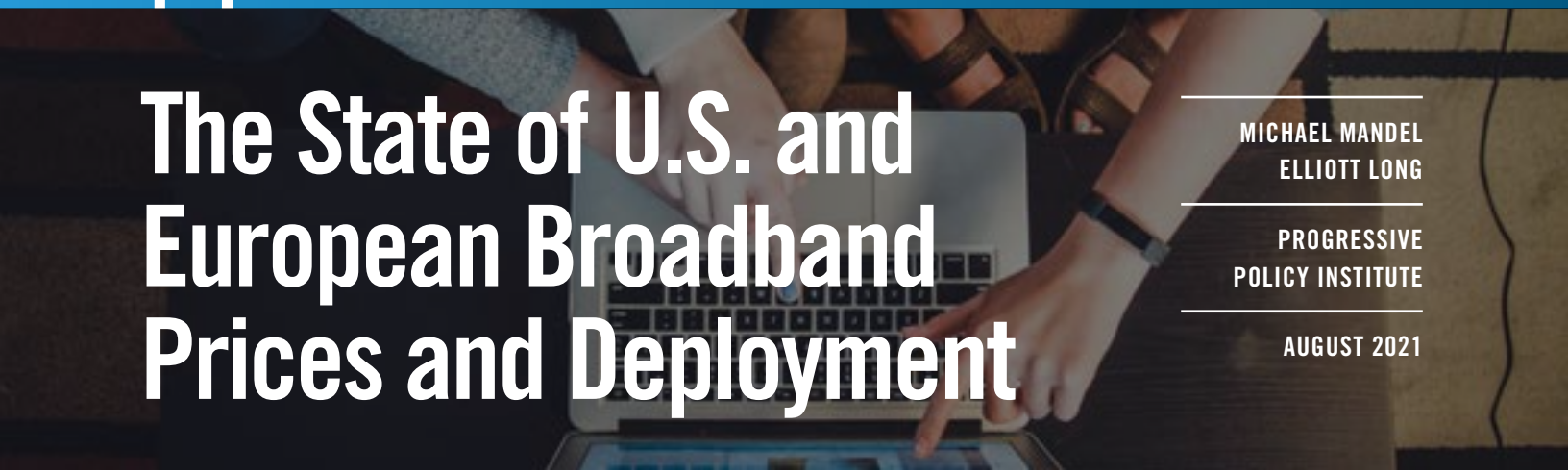

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INTRODUCTION

It's common for critics to unfavorably compare broadband prices in the U.S. to Europe. The Open Technology Institute's (OTI) Cost of Connectivity 2020 study reported that "people can still expect to pay more for internet service in the United States than in Asia or Europe."[1] There is often talk of a "broadband affordability crisis," which presumably Europe is not suffering from.

Indicators of an "affordability crisis" would typically involve consumers getting less for more. An affordability crisis involves price increases outpacing other parts of the economy and the access to the good or service being less attainable to more and more people.

In this paper, we consider a wide range of evidence available and provide our own new analysis to evaluate claims of a "broadband affordability crisis." First, we review several international comparisons of broadband prices alongside the data on differing deployment. Any consideration of how U.S. broadband prices stack up must take into account such deployment differences as well. Second, we provide a new analysis showing how broadband and telecom industry revenues have significantly declined as a share of the overall economy. This suggests that in an important sense, the broadband and telecom industry is providing far more services to consumers and businesses while absorbing a smaller share of spending.

While some in the United States claim the broadband industry is performing poorly compared with the other side of the Atlantic,

Europeans are not so sure that they are leading the broadband race. The European Commission's International Digital Economy and Society Connectivity Index, which measures fixed and mobile broadband deployment and adoption, fixed broadband speed, and fixed broadband price, found the U.S. to rank very close to the top EU countries in 2018, and well above the EU average (Table 1).[2]

TABLE 1. U.S. BROADBAND SCORES WELL AGAINST EU'S OWN RANKING

SELECTED COUNTRIES	OVERALL CONNECTIVITY SCORE, 2018*
JAPAN	74.5
EU TOP 4 COUNTRIES	70.4
USA	69.8
KOREA	68.7
UK	66.8
EU AVERAGE	61.5
CANADA	59.9

**Includes fixed and mobile broadband coverage and take-up, and fixed broadband speed and price*
Data: European Commission, International Digital Economy and Society Index 2020, Figure 5.

In particular, data shows U.S. broadband providers provide much better coverage than their European counterparts. Consider France, for example. The typical price for broadband in France — when you can get it — is relatively cheap, both compared to the United States and other European countries. However, as of 2019, 50% of French households did not have access to broadband speeds of 100 megabits per second (Mbps) or more.[3] In the same year, only 8% of the U.S. population did not have access to wired broadband speeds of 100 Mbps or more, according to the Federal Communications Commission (FCC).[4] Similarly, as of 2019, 38% of French households did not have access to broadband with download speeds of 30 Mbps or more. The comparable share of the U.S. population was 4%. Even if the U.S. figures overstate the availability of broadband, as some argue, the gap is enormous.

Indeed, the distribution of broadband service at various speeds is extremely uneven in European countries compared to the U.S. For example, Lyon, France, has 98% coverage at the 100 and 30 Mbps speed tiers.[5] Yet in the commune of Dagneux, just 15 miles outside Lyon — with a population of roughly 5,000 — only 4% of residences and businesses were eligible for 100 Mbps speeds and only 13% were connectable at 30 Mbps speeds.

Similarly, Bonn, Germany, enjoys 99% coverage at the 100 Mbps speed tier and 100% coverage at the 30 Mbps speed tier.[6] But in the Grafschaft municipality, approximately 15 miles outside Bonn — with a population of roughly 11,000 — speeds of 100 Mbps were available to only 29% of the population and 30 Mbps was available to 71%. By contrast, in Columbia, Illinois, 15 miles outside St. Louis, with a population of roughly 11,000, 95% and 100% of the population had access to 100 and 25 Mbps speeds with two or more providers, respectively.[7]

The link between low prices and weak deployment shouldn't be a surprise. European broadband providers have been underspending their U.S. counterparts for years, focusing on dense cities rather than the more-expensive-to-cover, low-density areas. A network that serves lower-density areas will inevitably be more expensive for everyone, even if an attempt is made to keep costs segregated.

Our second piece of analysis is a different but complementary way to see if the cost of broadband is increasing or decreasing. Instead of studying individual prices, which are difficult to track given various fees and differing plans, we look at total revenues from operation booked by broadband and telecom providers as a share of the overall economy. This measure accounts for all charges and fees being collected from consumers and businesses.

Since 2000, total broadband and telecom revenues have grown much slower than the economy as a whole. As a result, broadband and telecom revenues have shrunk more or less steadily from 2.7% of the economy in 2000 to 2.1% in 2019, imposing less of a burden on consumers and businesses even as they use much more data. By contrast, the revenues being collected by sectors such as healthcare, education, accommodations and food services, and finance and insurance have all grown faster than the overall economy, imposing more of a burden on consumers and businesses. By this aggregate measure, broadband and telecom services have become far cheaper.

COVERAGE VERSUS PRICE

The U.S. has long been wrestling with the problem of providing high-speed universal broadband at reasonable prices, especially to unserved rural areas. In a recent paper, we laid out a set of pragmatic principles for maximizing rural coverage without breaking the bank.[8]

Europe is facing the same issue as well, and in many ways is further behind. The European Commission report "Broadband Coverage in Europe 2019," released in September 2020, documents a situation in which high-density areas are well-connected, while many rural areas are not.[9] The report puts it straightforwardly:

> **Historically, it has been hard for operators to justify investments in rural areas. As a result of the low population density in these areas, investments can be viewed as economically less profitable. Consequently, achieving the Digital Agenda's goal of universal 30 Mbps coverage by 2020 continues to represent a considerable challenge in EU's rural regions.**

More broadly, broadband operators typically start by building in the densest urban areas, where the cost per potential customer is lower. As they expand coverage into less dense areas, the average cost per potential customer rises. Under normal circumstances, if operators are trying to maintain some degree of equity between urban, suburban, and rural areas, then countries with more coverage are likely to have higher prices.

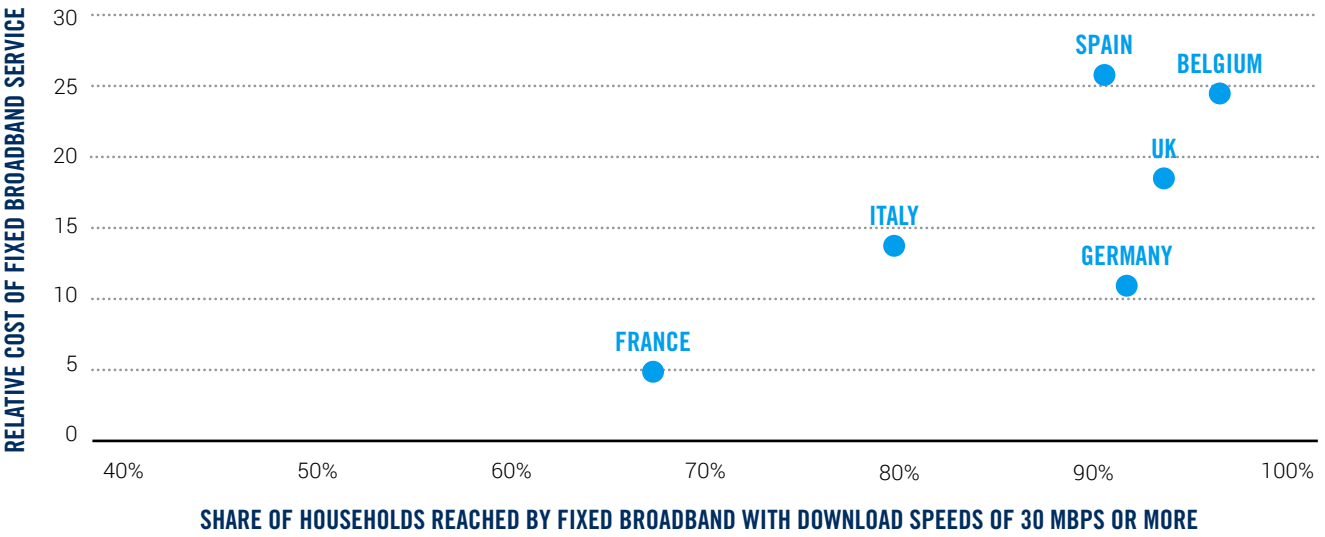
Data from the European Commission shows this intuitive link between broadband coverage and price. Table 2 reports fixed broadband coverage and general cost of fixed broadband service for the five largest European countries, plus Belgium, home to the capital city of the EU. We see that the countries with the widest broadband coverage tend to have the highest prices. The same data is displayed as a scatter plot in Figure 1, with the upward slope of the data points showing a clear link between increased deployment and higher prices in Europe.

TABLE 2. COVERAGE AND COST IN SELECTED EUROPEAN COUNTRIES

	SHARE OF HOUSEHOLDS REACHED BY FIXED BROADBAND WITH DOWNLOAD SPEEDS OF 30 MBPS OR MORE	RANKED COST OF FIXED BROADBAND SERVICE (HIGHER NUMBERS CORRESPOND TO MORE EXPENSIVE)*
FRANCE	62.0%	5
ITALY	77.5%	14
SPAIN	91.0%	26
GERMANY	92.2%	11
UK	94.9%	19
BELGIUM	98.3%	25

**Based on rank order of countries in Figure 22 of "Mobile and Fixed Broadband Prices in Europe 2019"*
Data: "Mobile and Fixed Broadband Prices in Europe 2019," "Broadband Coverage in Europe 2019"

FIGURE 1. DEPLOYMENT VS. COST IN EUROPE



Data: See Table 2

Where does the U.S. fit in? The FCC's International Broadband Data Report compared fixed high-speed deployment in the U.S. to 26 European countries and found the U.S. to lead the EU in fixed broadband deployment at the 2 Mbps, 30 Mbps, and 100 Mbps speed tiers.[10] 77% of rural U.S. households had access to 30 Mbps speeds, while 61% of EU households were connected. The U.S. ranked ninth in rural coverage, above the EU-26 average and major European countries like Germany, Italy, and France.

In addition to the high level of coverage in the United States compared to Europe, one has to read the fine print in the price comparisons to understand what they really mean. For example, the European Commission's 2019 report on fixed broadband prices in Europe found the U.S. to have higher standalone and bundled prices at every speed tier it examined. However, the report only sampled U.S. plans from California, Colorado, and New York — three of the highest-cost-of-living states in the country.[11]

Similarly, the most recent study from the Organisation for Economic Co-operation and Development (OECD), based on June 2017 data, finds the U.S. to be the second most expensive country for broadband.[12] However, its main focus is broadband offers that are "available in the country's largest city."[13] Thus, in the case of the U.S., the OECD study would compare other countries with plans in New York City, one of the most expensive spots in the U.S.

Even studies that look at more cities can be greatly influenced by selection and weighting criteria. The OTI Cost of Connectivity 2020 report analyzed 28 cities across Asia, Europe, and North America and found average monthly prices to be consistently higher in the United States than in Asia or Europe. "The average monthly price in the United States is $68.38 — higher than the average price for all of North America at $61.46, Europe at $44.71, and Asia at $62.41." However, OTI's report acknowledges that the cities it analyzes may not be representative of the price of internet in the country. The study also has no way of weighting broadband plans by the number of users and doesn't include low-income plans such as those marketed towards the FCC's Lifeline program or Comcast's Internet Essentials program.[14]

A report commissioned by NCTA (the Internet & Television Association), reviewed studies by OTI, OECD, and Cable.co.uk, and found several methodological flaws, including "the failure of the studies to account for underlying differences in the costs of providing broadband access."[15] For example, while the OTI study makes an effort to control for deployment costs by comparing cities with similar population densities, it fails to account for other factors such as right of way and labor costs, government subsidies, and consumer data consumption. Indeed, "U.S. broadband customers consume large amounts of data relative to customers in many other countries ... 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," the analysis notes.

The FCC's International Broadband Data Report analyzed fixed broadband prices in the U.S. and 25 comparison countries, including 17 EU member states, using indices that take price and quality (including country-level cost) into account.[16] The analysis found the U.S. to rank 21st under the price index, but second under the quality approach when controlling for costs and

other factors. This is an improvement compared to the FCC's 2018 International Broadband Data Report, where the United States ranked seventh under the quality approach.[17]

EUROPE

Let's dive a bit deeper into what's happening in the European broadband market, and especially France, Germany, and Italy, fellow members of the G-7. The French broadband plan, France Très Haut Débit Plan, aims to deliver 30 Mbps download speeds throughout the country by 2022 via two different tracks: private operators covering urban areas, which represent 55% of residences and businesses, and local authorities covering rural areas, which account for 45% of residences and businesses.[18] But in its August 2020 progress report, France Stratégie found that while 88% of premises were connectable in the 106 most dense towns and 57% were connectable in municipalities, only 18% of small towns and rural areas were connectable.[19] The moderate to high level of connectivity in dense, urban areas and lack thereof in rural areas in France suggests (in relative contrast to the U.S.) French broadband prices are low because the easy-to-reach, denser parts of the country have been mostly connected, while the more expensive, harder-to-reach areas have largely not been deployed to yet.

For example, Autorité de Régulation des Communications Électroniques et des Postes (ARCEP) maps indicate only 2% of premises in the Deux-Grosnes commune approximately 45 miles outside Lyon were eligible for 30 Mbps internet service and only 15% for 8 Mbps speeds as of September 2020.[20] In the Lège-Cap-Ferret commune, approximately 30 miles outside Bordeaux, 17% of premises were eligible for 30 Mbps speeds. And in the Briis-Sous-Forges commune, approximately 25 miles outside Paris, only 6% of premises were eligible for 30 Mbps speeds.

Similarly, in Germany, the federal government has made at least €22 billion available with the goal of nationwide gigabit networks by 2025.[21, 22] Eight percent of Germans remained unconnected at 30 Mbps speeds as of 2019 and, "Although rural coverage has significantly improved since 2019, from 66% to 75%, and is above the EU average, Germany still has a clear digital divide between urban and rural areas," the Digital Economy and Society Index states.[23, 24] Indeed, in the rural municipality of Eydelstedt in the state of Lower Saxony, only 24% of Germans had access to 30 Mbps speeds as of April 2021.[25] In Stäbelow in the state of Mecklenburg, only 18% were connected. And in Neudorf-Bornstein in the state of Schleswig-Holstein only 10% had access.

In Italy, the EU and federal governments have allocated more than €15 billion with the goal of nationwide 30 Mbps speeds and to bring 100 Mbps download speeds to 85% of the Italian population by 2020.[26] Additionally, in May 2021, it was reported an additional €7 billion was included in Italy's COVID recovery plan submitted to the EU.[27] But as of December 2019, only 67% of the country had access to speeds of at least 30 Mbps and 20% to speeds of at least 100 Mbps.[28] In the Molise region on Italy's east coast, one of the country's least populated regions, only 41 expansion projects had been completed by 2020, with 131 scheduled to be completed in 2021 and 2022. In the Umbria region, only 38 had been completed as of 2020, with 113 to be completed in 2021 and 2022.

Regulation may have also played a role in the U.S.'s faster deployment relative to

some European countries. A facilities-based competitive model can be defined as broadband companies providing similar services via networks they own, while under a service-based model entrants deliver services via competitors' networks at set interconnection rates. The U.S. has employed a facilities-based competitive model, while Europe has primarily utilized a service-based model. Falch and Henten (2016) assessed U.S. and European deployment strategies against three factors, including the use of a facilities or services-based competition model.[29] "The general conclusion seems to be that service-based competition promotes immediate competition, leading to lower prices and higher subscription rates, but that it may limit investments in new infrastructures and coverage by high-speed technologies," the authors wrote.

Similarly, Briglauer and Gugler (2013) used data from the 27 EU member states from 2005 to 2011 to study the effect of service-based competition on investment in next generation access (NGA) network deployment and found service-based competition negatively affected total investment in NGA networks for both incumbent and new entrant providers.[30] "Considering the role of service-based competition and the underlying set of sector-specific access regulations, our results reaffirm the US policy of adopting a deregulatory approach of broadband markets in 2005 and, since then, experiencing significantly higher NGA deployment levels and annual growth rates compared with the EU average," the authors conclude.

A MACRO APPROACH TO BROADBAND AND TELECOM PRICING

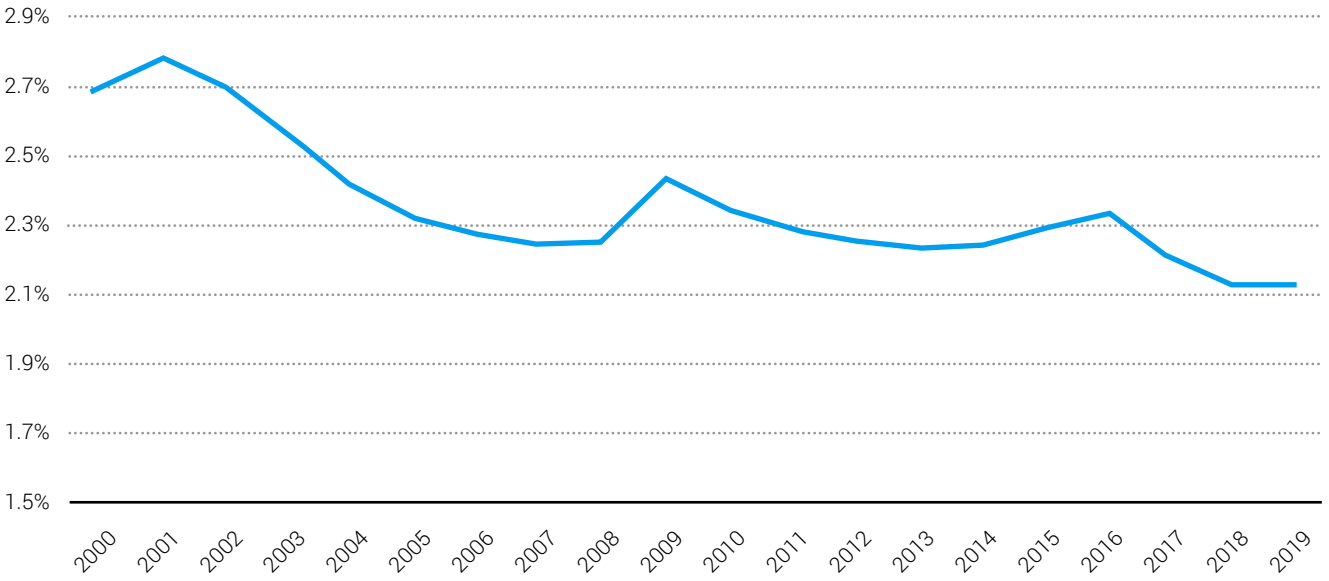
A constant theme in the debate over broadband pricing is the surprising difficulty of measuring the "price" of broadband, both across geographic areas and over time. Critics of the broadband industry focus on the variety of fees and added charges, including data overage charges, that may not be obvious to consumers beforehand.[31] Meanwhile the proliferation of promotional rates, low-income plans and broadband plans across different providers and geographies makes it challenging to get a handle on the trajectory of pricing in a convincing way.

One way around this problem is to take a "macro" approach to broadband price. Using government data, we can calculate the total revenues collected by U.S. broadband and telecom providers. Every dollar that they collect, whether in monthly fees or any special charges, has to show up on their financial statements — it's the law. We will ask the question: Are the total revenues of the broadband and telecom industry growing faster or slower than the rest of the economy? Equivalently, is the broadband and telecom industry's revenue as a share of gross output rising or falling?

If broadband and telecom industry revenue accounts for a rising share of gross output, then American consumers and businesses are paying more for broadband and telecom services relative to other goods and services. If broadband and telecom revenue accounts for a falling share of gross output, then the rest of the economy is paying less for broadband and telecom services.

To calculate gross output for broadband and telecom services, we combine data from the Bureau of Economic Analysis for four industries: cable and other subscription programming; wired telecommunications carriers; wireless telecommunications carriers (except satellite); and satellite, telecommunications resellers, and all other telecommunications.[32] Gross output in this context is equal to revenue from operations.[33] (Alternatively, we could have used the telecommunications revenue data collected by the OECD, which yields similar results).[34]

FIGURE 2. REVENUES COLLECTED BY TELECOMMUNICATIONS AND BROADBAND COMPANIES (AS SHARE OF GROSS OUTPUT)



Data: BEA

Figure 2 shows that in 2000, the revenue collected by broadband and telecommunications companies accounted for 2.7% of total gross output. With some ups and downs, that share falls to 2.1% by 2019. In other words, broadband and telecom companies are getting a smaller share of national revenue despite the vast increase in broadband speeds and availability of programming.

We can frame this in another way. Table 3 below shows the percentage increase in revenue for each sector, deflated by the price index for total gross output. Thus, this percentage increase reflects the real revenue growth for that sector, or equivalently the real increase in expenditures on broadband and telecom services.

We can see that real telecom and broadband revenues rose by only 8% in total since the business cycle peak of 2000. Revenue growth in the telecom and broadband sector is thus far below the revenue growth of the overall economy. By contrast, the real affordability crisis comes in sectors such as health and education, where spending and revenue growth far exceeds the growth rate of the economy.

TABLE 3. TWO DECADES OF SLOW REAL REVENUE GROWTH IN TELECOM AND BROADBAND INDUSTRY

	REAL REVENUE GROWTH, 2000-2019*
Utilties	-9%
Manufacturing	-1%
Telecom and broadband services	**8%**
Repair and other private services	20%
Construction	25%
Agriculture, forestry, fishing, and hunting	26%
Retail trade**	32%
All industries	**37%**
Transportation and warehousing	53%
Information except telecom and broadband	53%
Finance and insurance	53%
Professional, scientific, and technical services	54%
Accommodation and food services	56%
Wholesale trade**	61%
Administrative and waste management services	66%
Arts, entertainment, and recreation	68%
Management of companies and enterprises	74%
Mining	80%
Educational services	83%
Health care and social assistance	84%

**All sectors inflation-adjusted using the same gross output price index for entire economy. Thus, this column should be interpreted as the real increase in expenditures by consumers and businesses, not the real increase in output.*
***Gross output for retail and wholesale trade industries reflects gross margins, not total revenues.*
Data: BEA Gross Output data

CONCLUSION

Critics have proclaimed a broadband affordability crisis, comparing U.S. prices unfavorably to Europe, and suggesting that U.S. providers are using market power to jack up fees and charges in a way that is hard to track. We show that Americans enjoy more widespread access to high-speed internet than their European counterparts. Because some European countries like France have focused deployment on the more dense, inexpensive-to-cover areas, a natural tradeoff occurs where the price of broadband is relatively cheap in urban areas, but less dense areas lack high speeds or access at all (in relative contrast to the U.S.).

In order to address the question of complicated fees and charges, we look at telecom and broadband revenues, which account for all dollars collected by providers. We show these revenues — equivalently, spending by consumers and businesses — have grown far slower than revenues in most other parts of the economy. In a very real sense, the telecom and broadband industry is providing far more services while absorbing a smaller share of spending.

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