HIGHLIGHTS:
Broadband internet access promises to bring growth opportunities to individuals and businesses, especially those in rural communities. Despite its widespread impacts, it is difficult to measure or identify broadband’s causal effects on economic activity beyond the IT industry. Still there is early evidence to support that the impact of broadband adoption on the local economy is real and measurable.

Does broadband matter to the local economy, especially in a rural community? If so, how? In contrast to its predecessor of narrowband with dialup, broadband refers to high-speed internet access that is always on.

Broadband plays a key role in the current digital revolution, which defines the latest technological advance.

In the United States, the first commercial broadband deployment rolled out in the late 1990s. By 2004, about a third of households already subscribed to broadband services, according to the Federal Communications Commission.

Today, about 94 percent of Americans have fixed broadband services at threshold speeds. The availability and adoption rates of broadband internet, however, vary widely across the nation.

The major concern among policymakers is that some segments of our population, such as low-income households, the elderly and those living in rural areas, are left behind as a result of the digital divide. The digital divide refers to the gap between people who have internet and know how to use the service and those who do not have such access or knowledge.

In rural areas, nearly one fourth of the population still lacks broadband access. Only 43 percent of adults who have not completed high school use the internet, compared with 90 percent of those with a college degree (File and Ryan, 2013).

Broadband Advantages
There is a multitude of channels that broadband applications can affect economic activity. First, beyond the construction phase, development of broadband infrastructure promotes growth in the information technology (IT) industry and the expansion of workforce demand for digital skills. As a result, broadband helps expand the “creative class” of knowledge-based workers.

Broadband also promises to dramatically enhance business growth, particularly in the context of e-commerce, as well as the ways people work and receive education and training, healthcare, banking, emergency response, and other services.

Faster internet connection and expanded online applications can reduce the operating costs of businesses beyond e-commerce and potentially expand their customer base. Export-oriented and information intensive industries (e.g., banking and insurance) tend to reap more gains than industries that rely less on the internet (e.g., industrial manufacturing). Transaction costs can also reduce as faster internet connection offers businesses more capability to outsource or access suppliers around the world.

Workforce Mix
As for any technology, broadband applications can raise labor productivity, which is also translated into lower business costs and improved business competitiveness. However, the diffusion of IT applications through broadband has equivocal effects on the labor market.

On the one hand, IT complements employees who perform problem-solving and communication tasks. This raises the labor productivity and thus demand especially for occupations that require cognitive and digital skills.

On the other hand, like automation, IT may lead firms to replace workers who perform routine, manual tasks. As reported in an earlier Economic Pulse article, regional employment growth among occupations with medium level of digital skills (e.g., office staff, librarians) has been slower than employment growth in occupations with either high (e.g., IT staff, engineers) or low (e.g., personal care staff, grounds keepers) level of digital skills.

Broadband makes the labor market more efficient by reducing geographical barriers. The internet expands the opportunity to develop human capital through distance education and training programs.
For certain jobs, broadband connection allows individuals to work remotely at home. It also allows job seekers to more effectively communicate with employers in different areas, thus making the labor market more competitive for talented workers.

Quality of Life

Other than the direct benefits to the economy in terms of greater output and economic growth, higher connection speeds contribute to better quality of life as the internet facilitates access to goods and services available virtually around the world, such as online banking, telemedicine, banking, and bill payment.

Broadband-enabled Web applications can also help local residents expand their social networks and to integrate with the local community.

Online shopping sites not only allow residents especially in rural areas to access a wider variety of goods and services, they also allow price comparisons with local businesses. This contributes to greater societal welfare in the form of consumer surplus, which is the difference between the price that a consumer is willing to pay and what she actually pays.

In South Texas, Jordan Barton (2016, 2018) of the Federal Reserve Bank of Dallas has advocated the expansion of broadband infrastructure, leading to the development of a fiber-optics network in the Rio Grande Valley.

Accordingly, internet access can expand workforce opportunities through online training programs, especially the development of digital skills; close the “homework gap” by enabling students to access online learning resources at home; and promote business development beyond IT-intensive and hi-tech industries.

Importantly, as the internet reduces geographical barriers and allow people to run businesses online or work remotely for employers, expansion of broadband networks can help resolve the brain drain issue commonly facing rural communities.

Availability vs. Adoption

Quantifying the value of broadband to the economy is, however, difficult. First, the benefits cannot be realized by the development of broadband infrastructure alone (i.e., availability), but they also require businesses and households to adopt this technology.

Most public-funded initiatives for broadband have focused largely on its availability instead of its adoption. In the Coastal Bend, most communities have at least one residential broadband provider.

The adoption or penetration rate varies across neighborhoods though. Within the Corpus Christi metro area, more than 70% of residents in Nueces County have subscription to the internet service, but the subscription rates dropped to 66%-69% for residents in Aransas and San Patricio Counties. Still, broadband access for the Coastal Bend area is less than other parts of South Texas, particularly the Rio Grande Valley areas.

Empirical Challenges

Because the availability of broadband internet technology is only a recent phenomenon, there is limited empirical evidence to date to support its economic benefits. Yet measuring broadband’s economic impact is a critical step for developing broadband-related public policies, given the fact that broadband infrastructure involves relatively large capital investment.

The majority of empirical research, especially during the earlier years of broadband deployment, were case studies commissioned by parties with direct commercial interests in the industry, such as telecommunication providers (e.g., Crandall and Jackson, 2001) and IT associations (e.g., International Telecommunication Union, 2012), or by advocates and policymakers with an interest to promote broadband (e.g., Barton, 2016).

A related issue is that the benefits of broadband internet are typically not evaluated against its investment costs, especially in the case of public funding.

The most critical challenge in developing reliable estimates for broadband’s economic benefits arises from the fact that broadband as a general-purpose technology does not act on the economy in isolation, but as a complement to other information technologies. The internet affects individuals or businesses only in conjunction with computers, mobile devices and apps, and it must also lead to behavioral or operational changes.

Also, the effects of broadband may be strong in service industries relative to the manufacturing sector, but productivity improvements are not typically well captured by economic data. These measurement challenges have led to the so-called productivity paradox of IT.

Because business or labor productivity is not directly measurable but pervasive, the impacts on individuals and firms are commonly assessed
Number of Broadband Providers

Internet Adoption in the U.S. by County, 2013


SOURCES: Barton (2016, Chart 2); Census Bureau, 2013 American Consumer Survey.
with observable indicators of economic activity.

Other than case studies that reported anecdotal or qualitative findings, the early empirical literature focused on broadband’s aggregate impact on different countries’ output. Koutroumpis (2009) showed a positive correlation between broadband penetration in advanced countries and their GDP.

A number of studies also concluded that broadband had a positive and measurable impact on GDP growth. For instance, Qiang et al. (2009) of the World Bank found a 10% increase in broadband penetration raised GDP growth by 1.2 percentage points for high income countries, and the positive impact was even higher for low- or middle-income countries.

Findings for areas within the United States, however, are equivocal. Crandall et al. (2007) found no statistically meaningful results from state-level data. But Barton (2016) found a clear correlation between cities’ shares of households without internet access and their median household income. Gillett et al. (2006) also found broadband-enabled communities tended to experienced more rapid growth.

However, evidence supporting a link between broadband internet access and income does not necessarily imply any causal effect regarding the impact of broadband. It is conceivable that areas with higher income or economic growth are more able to afford broadband investment.

Also, despite the opportunities that broadband offers especially to rural America (Stenberg et al., 2009), there is little rigorous evidence to support the economic benefits of developing broadband infrastructure beyond its impact on the IT industry (Kuttner, 2016).

One exception is Whitacre et al. (2013), who found that low levels of broadband adoption in rural counties did lead to declines in the number of local businesses and total employment. The impact of broadband’s availability and adoption on income growth was statistically meaningful even after controlling for the likelihood that higher income communities had more broadband access.

However, they also found that an increase in the number of broadband providers without a corresponding increase in the broadband adoption rate does not generate any causal impact on local economic growth.

There is also evidence to support that the availability of broadband services raises local real estate values (Kolko, 2012; Molner et al., 2013). This reflects the benefits that households value for the broadband connection.

Kolko (2012) found that the impact of broadband expansion was stronger on IT than other industries and in areas with lower population densities. However, while he found broadband availability to raise real estate values and thus property taxes, he found no increases in local wages. So the net economic benefits to households may be ambiguous.

All told, even though there are no direct measures of broadband’s impact on the economy, empirical evidence supports its benefits beyond the impact of infrastructure investment especially in rural communities.

In the wake of the development of 5G underway, it is important to keep in mind that broadband internet is nothing more than a way to bridge the digital divide and to close some economic gaps for disadvantaged populations due to disconnection. What internet access offers the best is perhaps an opportunity for businesses and individuals to thrive.

Notes:

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References


