The Center for Growth and Opportunity at Utah State University

Are Government-Owned Broadband Networks Effective?

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Introduction

On November 2, the citizens of Kaysville, Utah, will decide if the municipality will build a new broadband network, often called a government-owned network ("GON"). Citizens and leaders face a tough choice. Putting an Internet service provider (ISP) under the auspices of a local government doesn't sidestep the endemic issues of cost faced by network builders. Since the entire network must be built before any revenues can be collected, new networks owned by municipalities face the same kind of financing problems and risks as any other entrant.

Survey results from citizens of Kaysville conducted by the city reflect what many think will happen with these projects.[1] Eighty-seven percent of respondents said that they expect better Internet service in the form of lower prices and higher quality service. Moreover, citizens as well as boosters of the project think the project will invigorate economic development. However, research into publicly owned networks presents a far more nuanced picture than one obtains from surveys of public opinion.

As Kaysville's own internal study notes, "it is inefficient and wasteful to build full duplicated digital" infrastructure, as this will likely raise the cost of telecom services to all public and private users.[2] Kaysville already has two wired ISPs and three wireless ISPs,[3] so the introduction of a new municipal Internet provider doesn't necessarily guarantee a better, more efficient market, or an invigoration of the local economy, but it is likely to cost taxpayers handsomely.

The effect of a new entrant for consumers and businesses depends largely on the price and quality of the new broadband system in conjunction with the reactions by other providers in their price-quality offerings.[4] The following report details some of the key insights from the academic literature on whether government-owned networks are effective at increasing quality, competition, and economic growth. Three lessons for policymakers shine through:

- Building a new network is costly and risky;
- Broadband competition is complicated but is largely a product of local conditions like population density; and
- Municipal broadband is often a popular investment politically, but the actual benefits to citizens are often mediocre.

When Does Building a Broadband Network Make Sense?

Broadband networks require a large initial investment, but the costs drop substantially for each additional subscriber.[5] High fixed cost and low marginal cost structures tend to give rise to markets with only a few competitors. Economists call markets consisting of a small number of competitors oligopolies or oligopolistic markets.

Central to the cost of operating a network is the technology necessary to make it run. ISPs have a range of technological options when it comes to deploying service.[6] For example, CenturyLink and EarthLink utilize existing telephone networks, while Comcast depends on the cable network. An ISP could also rely on a completely new system that is designed from the ground up, which is what is being proposed in Kaysville.

Costs also vary widely depending on population density, local conditions, and importantly, regulatory compliance costs. A broadband project in rural Wisconsin to upgrade an old telephone system cost roughly $8,000 per household,[7] whereas in rural Tennessee the cost for a new fiber broadband network hovered around $5,000 per household.[8] Expanding broadband to rural areas tends to be more costly, because the large fixed costs must be spread over fewer people. The last time the Federal Communications Commission ran the numbers, the agency estimated that the hardest to reach households would cost nearly $90,000 per premise to connect to broadband.[9]

In the middle of a large, dense city, hooking up another household might cost only $800.[10] However, even in such cities,

costs can climb. Networks typically string their wires on already existing poles, but if the poles are crowded or if the city requires utility wiring to be underground, the costs can quadruple.[11] Per-household cost drops with more density, but projects can still be slowed by the municipal permitting process, state regulations, or federal requirements like a National Environmental Policy Act (NEPA) review.

Obtaining permission from the municipality adds cost and time to a build, both of which can vary greatly depending on the area. Stephen Milton, who helped to design and build the Gigabit Now service in Sea Ranch, California explained that his company had to obtain permission from 23 separate local, county, and federal agencies to get the new project up and running.[12] Broadband provider Sacred Wind out of New Mexico wrote in a filing to the FCC that an application involving one landowner and one authorizing jurisdiction commonly takes 2–4 years to complete, while something more complex, that involves more than one piece of land spanning multiple authorizing jurisdictions, can take anywhere from 4 to 8 years to complete.[13] Indeed, when San Francisco first considered building a GON, the feasibility study named the city's knowledge of how to traverse its own red tape as a critical asset.[14] GONs have to go through the permitting process like anyone else, they just tend to know how to do it much better.

Users in a market vary greatly in what they demand. Gamers tend to like low latency so they can quickly react in an online setting. Other users might want high speeds to download documents and watch streaming video on a couple of devices. Meanwhile, some broadband subscribers might only need the service for a limited range of activities like email or surfing the web. The variety of service offerings from broadband providers reflect the variety in consumer demand. However, with Internet services, consumers tend to find little value is added beyond 100 Mbps.[15] As a result, firms tend to be limited in the services they can provide and the price points at which they can offer service.

The break-even point at which a new broadband project will be a good investment can vary massively.[16] Within the industry, take rates express the percentage of customers who eventually subscribe to the service as compared to all of the homes passed in a given broadband build. These take rates in turn influence the number of potential competitors that a market can maintain. As the organization Community Networks notes, "The [average] 30% take rate minimum means most markets would support, under ideal circumstances, no more than three competitors."[17] In dense urban settings, a 20 percent take rate might be sufficient to cover costs, while upwards of 80 percent may be needed for a rural project to break even.[18] Indeed, research into GONs finds that many are cash flow negative and thus fail to break even.[19]

Studies on Broadband Competition

Official statistics from the Federal Communications Commission in June 2019 suggest that 70 percent of Americans have access to two or more broadband providers when satellite options are excluded, while only a quarter, mostly in dense areas, have access to three or more.[20] Investments made in the past by telephone and cable companies, as well as more recent upgrades, tend to be the key determinants of the price and quality of broadband available in a region.[21] As expected, regions with more broadband providers tend to have faster download speeds.[22] A longitudinal study found that most markets have shifted toward higher quality service tiers over time.[23] Molnar and Savage find that markets with two wireline ISPs have faster download speeds than regions with only one.[24]

Research on new firm entry over time, rather than static snapshots of a single year, tend to show dynamic markets. Prieger et. al. examined broadband markets from 2011 to 2013 and discovered that DSL service gets better when a cable player enters the market, and also when cable operators start to offer faster speeds.[25] More recent work from Flamm and Varas (2019) found that entry or exit by wireline competitors in areas with existing legacy networks like cable or telephone "has essentially no impact on maximum download speeds offered by wireline ISPs."[26] When wireless competitors enter and exit the market, in contrast, there are "large changes in maximum download speeds offered by wireline ISPs." This suggests competition in the near future might be increasingly influenced by wireless carriers.

Another line of inquiry in the entry literature follows from pioneering work by Bresnahan and Reiss that found the population required to support a second firm is often much larger than the population needed for a single firm.[27] In their example, a small town of 800 people could support one dentist, but if the entry of a second dentist intensifies competition, it will take *more than* 1,600 residents to support two dentists. Sometimes, it will take nearly double the population. In Bresnahan and Reiss's example, a total of 2,400 residents would be needed to support a second dentist. The addition of a third or fourth firm often requires an incremental population increase similar to the second. Moreover, competition often kicks in quickly, but doesn't increase much with each additional entrant. Using the Bresnahan and Reiss framework, Xiao and Orazem estimated that, "Once the market has one to three incumbent firms, the fourth entrant has little effect on competitive conduct."[28]

In one of the few studies focused on municipally owned broadband networks, Steve Landgraf exploited variation in cities with and without state-based restrictions on municipal broadband to understand how GONs affect the market. Some states don't allow local cities to build broadband networks, so by looking at similar cities that have municipal power companies but differ in their state restrictions, Landgraf was able to isolate the effect of municipal broadband after the network became operational. Landgraf discovered that GONs are "associated with lower maximum upload and download speeds offered by private cable and DSL providers."[29] In short, that research suggests government broadband projects like Kaysville's can crowd out investment.

Effect on Economic Growth

The availability of broadband tends to strongly correlate with economic growth and higher incomes. Correlation, however, doesn't mean causation. While there is agreement on the broad positive link between the two features, there is less agreement on the mechanism that binds them.

Macro-level studies almost universally show a positive correlation of broadband deployment with growth.[30] One often cited report from the World Bank concluded that a 10 percentage point increase in fixed broadband penetration increases country-level GDP growth by 1.2 percent.[31] Employment, as well, seems to be associated with broadband access.[32] Rural areas with access to the technology in the early 2000s were more likely to have new firms locate there.[33] However, the effect was the most pronounced for "rural areas and those adjacent to a metropolitan area, suggesting that this effect increases with agglomeration economies." Agglomeration economies is just a fancy term to describe the benefits from being located near a city. In related research, the National Telecommunications and Information Administration (NTIA) found that proximity to central cities may be more strongly associated with the availability of the highest speed levels of broadband service than population density.[34] In other words, being close to a large population center might be driving broadband deployment.

The overall impact of broadband availability on firms, industries, and specific regions is more muddled than the relationship specifically with GDP growth. Broadband tends to have a positive impact on sales,[35] but little impact on firm level productivity.[36] Economists investigating the impact of the technology in Ireland concluded there was "no statistically significant effect of broadband adoption on firms' productivity (growth)."[37] Knowledge-intensive firms often locate their business based on broadband availability, leading to a clustering of these businesses in regions with widespread access.[38] But one study found digital connectivity in remote rural areas actually hurt local entrepreneurs because it opened these regions to e-retail.[39] Research focused on Swedish firms also uncovered a negative relationship between super-fast broadband and local retail sales.[40] For voters and leaders, these effects should be weighed against the potential consumer benefits of access to lower-cost products.

Terminology is key to unraveling the relationship between broadband and economic development. Broadband *access* or *deployment* isn't the same as broadband *adoption*. Thus, while the technology has to be deployed before it is adopted, adoption seems to be a much better predictor of economic growth.[41] After all, broadband only exists because there is demand for it by consumers and producers. Still, broadband rollout is tightly connected to economic growth. The few studies that try to understand this relationship by employing causal identification strategies muddle the picture even more. De Stefano et. al. found no effect from broadband on the performance of firms in England,[42] while Kolko found a positive effect on economic growth but not on employment rate or wages.[43] Work from Akerman et. al. discovered that broadband rollouts tend to skew skill demand, improving the labor outcomes and productivity of skilled workers while worsening the outcomes and productivity of low skilled workers.[44] Other research tends to confirm this skill polarization effect.[45]

Properly designed research on municipal networks is rare, but there are two standouts. An econometric study of municipal broadband conducted by economist Brian Deignan found that business establishments grew by about 3 percent after a GON entered.[46] However, worker income saw a drop of 1.3 percent, while private sector employment saw no growth. At the same time, local government employment expanded by around 6 percent. The effect may have been to shuffle the deck, not increase the size of the pie.

Using a similar method, Sarah Oh disentangled the various factors affecting growth to examine whether municipal broadband tends to stimulate economies. Oh detected no change in the unemployment rate, the household broadband subscription rate, or labor force participation due to GON entry.[47] After controlling for the nonrandom nature of these projects, Oh again confirmed that there was no change in these three key factors.

The Key Takeaways for Policymakers

Policymakers, especially those in Kaysville, need to attend to the specifics of each proposal and what they want to accomplish with a GON. Constructing a new ISP from the ground up is difficult and costly work. As one review of experiences in Europe framed it, "Municipalities have to dive into detailed operational details in order to achieve successful project results." Importantly, the roles and responsibilities of the operator, especially as it concerns operation and maintenance, need to be clearly defined.[48] In the United States, many local governments fail to conduct proper due diligence, which is reflected in the fact that so many broadband projects are cash flow negative.[49]

Kaysville's broadband project remains difficult to assess. Proponents say a detailed market analysis complemented by clear survey data on customer demand has been conducted, but it has not been released to the public. Nor has the city produced a detailed sensitivity analysis that could help educated audiences understand the risks. Because the outcomes of broadband projects depend greatly on local market conditions, it's difficult to know whether Kaysville's project will be worthwhile for residents.

The research findings on economic impacts from broadband are not comforting. While there is a general positive relationship between broadband and the economy, building a new government-owned network does not automatically cause economic growth or other benefits. Indeed, many government broadband projects fail to break even. Municipal broadband often sounds good in theory and may therefore be popular politically, but the actual benefits to citizens can be outweighed by the costs.

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