

Sam Nolan

Accessibility, Economy, and the Digital Divide: The Thematic Differentiations of Broadband Internet Scholarship



Introduction

While still a relatively new field of study, the scholarship surrounding broadband has undergone a rapid evolution of focus, closely mimicking the wider culture concerns surrounding telecommunications and its public access. Over the course of the past decade, access to affordable and reliable broadband internet has quickly become a defining issue of this contemporary digital age. Of particular note is how broadband internet and its access has become emblematic of the ever-widening divide between class and socio-economic status. The marked difference between rural and urban communities in particular stands as stark evidence of a growing digital divide that possesses the potential to create a hierarchical caste system based on infrastructural access.

Stratifying society and culture even further within the United States is a reality that can be ill-afforded, especially when one considers the uncertainty that has become our shared reality. The continued and ominous presence of the COVID-19 pandemic has illuminated a host of

inequities spread throughout American society, and with these dirty secrets put out to air, there exists only a limited window of opportunity to address and rectify such issues before cultural and economic turmoil erupt.

Access to reliable broadband internet connection varies widely between metro and non-metro households. By 2007, nearly 85 percent of urban and metro area homes enjoyed access to broadband services, while in contrast only 70 percent of homes in rural areas could claim that same privilege (Stenberg, Morehart, & Cromartie, 2009). As American society becomes ever increasingly reliant upon digital services and their infrastructures, this stark difference in access will only further cause the separation between economic classes, as lack of access translates to a lack of economic and cultural opportunities.

It is then the aim of this review essay to highlight the ever-growing importance of broadband study. This shall be achieved by tracing the history of academic scholarship on the subject, and on the widening digital divide that has resulted from broadband inequality. This review essay will draw upon a variety of academic backgrounds to fulfill this goal. A primary focus shall be paid to scholarly work rooted in the fields of economics and infrastructural studies, either through the lens of ethnographic study or broad industrial survey. It is the intention of this review essay to pay special attention to broadband scholarship and study that advocate for more thorough rural broadband access and telecommunications as a necessary utility of this modern digital age.

Before delving into the history of study surrounding broadband internet, it is important to maintain a thorough understanding of the term itself. According to the United States' Federal Communications Commission, broadband internet is any connection that can maintain a connection consisting of "a minimum of 25 Mbps download and 3 Mbps upload speeds." Broadband internet connections manifest over a variety of different connection technologies such as fiber optics, wireless, DSL, cable, and satellite. While each technology has its own characteristics, as well its own strengths and weaknesses, it is not the purpose of this review essay to debate the merits of each manifestation of broadband internet (although there certainly exists arguments that some implementations are far more reliable than others). Instead, this review essay will strive to focus its attention on broadband as a collective term and the holistic concept's presence in American society.

Of equal importance is the outlining of the term *digital divide*. In essence, digital divide is used to reference the separation of individuals, communities, and institutions able to benefit from the internet and those which are not. The term itself has its origins in the writings concerning the *social contract*, wherein philosophers such as Jean Jacques Rousseau argued in favor of governmental intervention to "ensure that any society's economic benefits should be fairly and meaningfully distributed" (Wikipedia, 2020). In the modern context of broadband internet services, the digital divide is used to illustrate the failure of the meritocratic concepts inherent in American culture, chiefly the American Dream.

Thematic Differentiation of Broadband Scholarship

There exists within broadband scholarship heavy theming on the focus of studying broadband access. These themes are most easily broken into three parts: Infrastructural emphasis, Economic emphasis, and Sociological emphasis. While it would be tempting to assert that this trio of themes followed a strict chronological order of prevalence, that the rise of one focus led to the elimination of another. To do so would be misguided and ultimately false. In reality, there exists significant amounts of overlap between each theme's introduction in the field. For example, the Economic focus in broadband scholarship did not simply disappear once works rooted in Sociology began to emerge. For the purposes of this literary review, each theme will be discussed in the following order of Infrastructural, Economic, and finally Sociological. This will serve to provide a sense of progression as each theme is introduced to the field of broadband studies.

Literature Review

Broadband Scholarship: Broadband and STS

The generally accepted narrative in telecommunication studies is that more infrastructure and more equitable access equals more opportunities and growth. As a result of this, scholarly literature on the subject of broadband took on a notably infrastructural bent. The focus during the early and mid-2000s was the ways in which telecommunication networks could best benefit communities, and how the struggles to bring broadband to non-urban and metro markets could be minimized. According to the USDA, poor non-metro area households are half as likely to boast access to broadband services as economically equivalent metro area homes. Even now, at the time of this text's writing, it is exceedingly common for low population density areas to have less than three internet service providers, or ISPs as they are more commonly known, to choose from (Stenberg, Morehart, & Cromartie, 2009). In fact, by 2006 a USDA report indicated that roughly three dozen non-metro areas had zero access to any broadband provider.

Within scholarship detailing the regulatory policy and infrastructural struggles of broadband adoption, special attention is paid to the financial difficulty of network installation. "Areas with low population size, locations that have experienced persistent population loss and an aging population, or places where population is widely dispersed over demanding terrain generally have difficulty attracting broadband service providers" (Stenberg, Morehart, & Cromartie, 2009). This difficulty is further compounded by the increase in pricing ISPs use to offset the low potential for profit and demand.

The reluctance of Internet service providers to expand into rural and non-metro areas was initially seen as simply a fear for financial loss. To help combat this reticence, federal regulation was passed to provide incentives for rural broadband expansions. Of particular note are two policies: the 1996 Telecommunications Act and the 2008 Farm Act (Food, Conservation, and Energy Act of 2008 as it is otherwise known). The Telecommunications Act established the Universal Service Program, which acted to fund broadband internet access for "medical facilities and elementary and secondary schools" (Stenberg P. L., 2010). The Farm Act served as reauthorization of telemedicine and remote learning programs whilst creating broadband access

grant and loan programs (Stenberg, Morehart, & Cromartie, 2009). The USDA received a further two and a half billion dollars in 2009 as part of the American Recovery and Reinvestment Act of 2009. This was for the explicit purpose of creating grants and loan programs to further increase broadband accessibility in rural and non-metro areas. (Stenberg, Morehart, & Cromartie) 2009).

Much of the broadband scholarship of the period surrounding these government policies was focused on their efficacy, or rather more accurately, their lack of efficacy. The Telecommunications Act of 1996, whilst allowing for “the regulatory action to mandate it” did not require support for internet expansion into households (Stenberg P. L., 2010). Of particular interest to telecommunication scholars such Peter Stenberg was not simply the creation of their bills nor their effects. The language and contents of such broadly sweeping policy was seen to be predictive of future efforts of expansion.

As Stenberg notes, the Food, Conservation, and Energy Act of 2008 was not just prominent for the \$25 million in annual grants, loans, and loan guarantees it provided to aid in the increase of broadband and other telecommunication access in rural areas (Stenberg P. L., 2010). The Act was important for the ways it shaped regulatory understanding of broadband internet. A provision of the Food, Conservation, and Energy Act was to regularly review the definition “of what constitutes broadband service”, a decision that would allow for lawmakers and the federal government to “take into account changes in technology” (Stenberg P. L., 2010).

Stenberg’s work is not focused solely upon the efforts of American federal programs. Of equal, and sometimes greater, importance is the role of state and local governments in the expansion of equitable internet access. Stenberg asserts that the policy initiatives of state and local governments can be classified into three separate categories: 1) *demand enhancement*, 2) *rule regulation*, and 3) *finance and infrastructure policies* (Stenberg P. L., 2010).

As previously mentioned in this text, the low population densities of many rural and non-metro communities result in relatively low demands for telecommunication and broadband services. In efforts to combat this, state and local governments enact policies that can simulate greater demand for these services. These policies, Stenberg demonstrates, take the form of extension programs, programs that seek to increase business acumen and expertise using information and technology training (Stenberg P. L., 2010). The importance of these types of programs, Stenberg notes, is that they artificially increase the use of such technologies in small businesses, thus increasing their demand for access.

Fragmented demand is also often identified as the limiter in broadband expansion. In cases such as this, Stenberg notes that local governments adopt “programs that will aggregate demand” (Stenberg P. L., 2010). Acting as a monopsonist, local governments follow one of two paths that Stenberg observes. First, is acting as an “anchor tenant”. This allows for local governments to act as a negotiator to bring a service to a particular area or community, allowing for internet service providers to offer services to others (Stenberg P. L., 2010). Second, local governments can act as a “group pricing facilitator”. In this type of program, Stenberg asserts that local governments act “as an agent for a group of potential users to obtain the service”. This may entail direct negotiation with an internet service provider or a more hands-off approach of assisting in the creation of a special interest group to negotiate instead (Stenberg P. L., 2010).

The second important mechanism that Stenberg notes are rules, regulation, and tax policies. This mechanism, he notes, usually takes the shape of local facility accessibility reforms or “industry specific regulations. Access reform accounts for issues “such as zone and rights-of-way” while industry specific regulations include “franchising and licensing” (Stenberg P. L., 2010). These types of reformative adoptions do not account for the various taxes and fees that local governments aim at telecommunication companies. Fees that, as Stenberg points out, include franchise taxes, telecommunication taxes, licensing fees, utility taxes, telephone relay surcharges, public service taxes, and infrastructural maintenance fees (Stenberg P. L. 2010).

The third and final category of local government involvement is that of finance and infrastructure policies. This category is representative of the instances wherein local and state governments make their own investments into telecommunications infrastructure through the establishment of government run companies (Stenberg P. L., 2010). Stenberg notes that such direct involvement, while being one of the “only ways to provide competition”, has been exceedingly controversial when put into practice throughout the United States.

Scholars such as Stenberg take what this text would classify as a “reactionary” approach to the study of broadband infrastructure and policy. Work like his takes a nearly historical approach in detailing the ways in which government agencies and policies have affected change in the telecommunications industry. This approach does not comprise the entirety of the infrastructure focused study on broadband internet. Other academics such as Robert LaRose take a more “predictive” approach, using data to best define which sort of policies could best engender broadband growth and spread.

LaRose’s work is primarily concerned with the adoption of novel forms of communication and technology. This is not to say that broadband is still considered a new form of telecommunication technology. The work of LaRose and his contemporaries instead contends that a novel technology should be considered “novel” in the context of the community within which it exists or is introduced. For example, a broadband DSL connection recently installed to a rural farming community in South Dakota is a novel technology for that community, as something similar had not existed there prior.

Of particular interest of this predictive work is its assertion that while demographic variables do play an important role of basic internet adoption in rural areas, the influence of such statistics on the introduction of further broadband services is rather “weak.” (LaRose, Gregg, Strover, Straubhaar, & Carpenter) 2007). While demographics hold a certain ability as an “explanatory power”, LaRose et al. contend that individuals and communities without access to a technological affordance such as broadband internet cannot “be expected to reliably assess the expected outcomes of its usage” (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007). There exists a logical flaw surrounding the introduction of broadband to rural communities. The problems that have hounded rural communities for decades cannot be solved by the introduction of broadband services. It is these very same issues, LaRose contends, that often prevent internet services from being built in rural areas.

LaRose et al. argue that there exists five individual characteristics of an innovation that affect the rate of its adoption: (1) relative – the degree to which an innovation is perceived as better than already extant alternatives; (2) compatibility – the degree to which an innovation is consistent with a community or individual’s values, beliefs, and needs; (3) complexity – the

perceived difficulty of adopting the innovation; (4) trialability – the degree to which an innovation can be iterated on; and (5) observability – the degree to which the benefits of the innovation are easily visible (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007). Using these characteristics serve to allow policymakers and academics to best predict the efficacy of certain technological innovations.

Specifically, in regard to the adoption of broadband internet services in rural areas, the best predictor for successful integration is twofold. First, “direct personal experience” with usage of the internet is a necessary precondition of adoption. Private access in the workplace can be directly linked to broadband internet desire, with public access in spaces such as libraries and community centers providing a weaker, but still important, relationship (LaRose, Gregg, Strover, Straubhaar, & Carpenter, 2007). Second, supplementation of public policy such as the Telecommunications Act of 1996 allows for the strengthening of the chances for successful adoption.

There exists a sizable portion of the scholarly study on broadband internet that concerns itself with deducing the best policies and regulations for continued and equitable broadband expansion. Lourdes Montenegro and Eduardo Araral provide critical work on this particular subject. The duo argues that the “overriding incentive for providers with market power is to reduce quality of service” (Montenegro & Araral, 2019). This is particularly salient when one considers that “low population density areas tend to have less than three internet service providers” (Stenberg, Morehart, & Cromartie, 2009). The pervasive presence of internet provider monopolies needs to be addressed if broadband access is to continue to grow, argue Montenegro and Araral.

One method the two propose is that of enhancing market competition. The rationale is that “firms facing competition and threat of losing market share to new entrants may be more likely to invest in improved network infrastructures” (Montenegro & Araral, 2019). The introduction of regulations is noted to sometimes function as a double edge. Licensing requirements, for example, can “easily limit entry into telecommunication and internet markets” (Montenegro & Araral, 2019). While this outcome is certainly possible, Montenegro and Araral contend that developed nations with more rules strengthening competition and easing entry into telecommunication markets “achieve better outcomes for quality of service”. In fact, Montenegro and Araral provide what they argue is the most effective form of competition enhancing regulation: access regulations.

Covering both pricing and technical access requirements for entry to the telecommunications market, access regulations allow for new industry entrants to gain “more control over their equipment and more leeway for service differentiation” (Montenegro & Araral, 2019). Contemporaries of Montenegro and Araral state that access regulations best function when placed in conjunction to “ladder of investment” policy, wherein a regulatory body such as the FCC would encourage entrants to progressively invest in “less replicable network assets” (Montenegro & Araral, 2019). By slowly limiting and eventually ending mandatory access to local loops, the ladder of investment approach would allow for facility-based competition to emerge (Montenegro & Araral, 2019).

Broadband Scholarship and Economic Study

The second major theme surrounding broadband scholarship is that of the economic focus. As a theme, the economic study of broadband is rather varied. It ranges from dealing with the effects of broadband access on unemployment, to broadband's impact on housing values, and to the actual costs of maintaining widespread broadband networks. The economic theme is perhaps the most disparate of the main categories this literature review seeks to address.

First, there exists the economic broadband literature that deals with issues of unemployment and labor share. Lisa Dettling's work on her *Broadband in the Labor Market* is a fantastic starting point for this perspective. She qualifies that economic broadband study is incredibly important, as the "potential effects of internet use on labor supply are multidimensional because of the many ways the internet is used" (Dettling, 2017). To best assess the effects of internet use and access on labor supply, Dettling made use of Current Population Survey (CPS) data. The CPS is a monthly survey of roughly sixty thousand American households conducted by the United States Census Bureau for the Bureau of Labor Statistics. For the purposes of her work, Dettling chose to focus on "self-reported home high-speed internet use and labor market outcomes" (Dettling, 2017).

The key findings of Dettling's work indicates that 1) high-speed internet usage leads to an increase of 4.1 percent in married women's labor participation and 2) that high-speed internet is correlated with increased hours worked and employment rates amongst married women reporters (Dettling, 2017). With these findings in mind, Dettling asserts that there exists a clear and healthy correlation between internet use and the "labor supply decisions of married women". Dettling seeks to further prove this theory by pointing to trends in labor force participation both in the early 2000s and the beginnings of the early 2010s. Early in the millennium, aggregate trends were declining, only to spike upwards over the course of the next decade (Dettling, 2017). Dettling asserts this is a direct result of increased broadband internet access, facilitating heavier internet usage at home and at work.

Other academics studying broadband and its relation to labor include Bento Lobo and Rafayet Alam. Dettling sought to determine internet access effects on labor participation, or the amount of time an individual is able to commit towards employment. Whereas, Lobo and Alam seek to understand specifically how broadband speed can affect unemployment rates in the United States. At the time of writing, Lobo and Alam's *Broadband speed and unemployment rates: Data and measurement issues* is a recent addition to the scholarship surrounding broadband internet.

Published in the Fall of 2020 in conjunction with Brian Whitacre, Lobo and Alam assert that the more contemporary issue concerning broadband is not purely access, but rather it is the continued improving of connection for consumers. Citing the National Broadband Plan, the trio of scholars asserts that a minimum of 100 million American households should boast download speeds of "at least 100 Mbps and upload speeds of at least 50 Mbps" (Lobo, Alam, & Whitacre, 2019). By focusing their attention on the state of Tennessee, Lobo, Alam, and Whitacre seek to demonstrate that internet speeds are a significant determinant in economic

growth and participation.

Over the course of 2011 to 2016, the trio recorded and analyzed the employment and broadband statistics of 95 counties located throughout the state of Tennessee, which is the 23rd most connected state in the United States (Lobo, Alam, & Whitacre, 2019). The resulting data demonstrates that high broadband speed plays an important role in lowering unemployment rates. Counties with high-speed connections held a .26 percentage lower unemployment than counties with slower speeds. Counties that were early adopters saw an even greater decline in unemployment, with a further drop of 0.16 percent in unemployment during the five-year study (Lobo, Alam, & Whitacre, 2019). The data resulting from this study paints a convincing portrait that policy supporting broadband improvement would have significant impacts on employment rates.

Other research on the economic aspects of broadband internet tends to focus more on the ways in which internet access can increase home and community value. In fact, it is essential to note that desire and valuation of broadband access can vary widely in certain communities. Urban and metro area communities tend to value existing internet connections more than comparative rural communities. In contrast, rural households held more value in publicly funded broadband access than urban counterparts (Thomas & Finn, 2018).

Steven Deller and Brian Whitacre concern themselves with whether internet access and speeds can exert any effect on housing values. While it is made clear that population density, education, and income are the primary factors for better internet speeds, internet service providers pass on certain homes and communities that they deem unlikely to provide effective financial return. Of key importance is that Deller and Whitacre found that following the introduction of broadband into a rural community, home resale values would enjoy a minor increase. For example, within their study, the duo found that a ten percent increase in internet speeds at a county level led to an average increase in housing values from \$230 to \$661 (Deller & Whitacre, 2019).

Other economic focused broadband scholarship is preoccupied with the costs of expanding broadband infrastructure and networks. In their *A cost study of fixed broadband access networks for rural areas*, Juan Schneir and Yupeng Xiong seek to assess the cost of bringing fixed access broadband networks to rural communities. By analyzing the costs of certain access materials, Schneir and Xiong identify several connection systems as potential candidates for rural expansion: FTTH, FTTdp-Building, FTTdp-Street, FTTRN, FTTC, and OD-VDSL.

The term *geotype* is used to determine the differing characteristics of terrain in rural areas, classification based on distance, the total number of premises in the area, premises density, and average homes (Schneir & Xiong, 2016). The resulting data indicated that there could exist a nearly as high as 80 percent difference in cost between different geotypes (Schneir & Xiong, 2016). Schneir and Xiong postulate that to limit deepening the digital divide, contractors will seek to use a variety in material costs and broadband access networks to expand access.

Broadband Study, Sociology, and Social Change

In more recent years, broadband study has taken on a much more sociological bent, framing the issues of telecommunication access as one of social and natural rights. This type of socially focused work holds a tendency to argue that access to broadband and other forms of telecommunications can most often be determined by race and income level rather than population density or geographic location. Many scholars of this style assert that broadband access is frequently used as a way of exerting frictionless control upon subaltern or marginalized groups, efforts to limit political or economic impact of some communities.

Christopher Reddick, Roger Enriquez, Richard Harris, and Bonita Sharma all seek to demonstrate that the digital divide is no longer purely an issue of the rural versus the urban. The rifts in telecommunications access can also be observed in intra-urban settings, where low-income areas claim significantly lower adoption rates for broadband networks. By conducting a survey within San Antonio and the surrounding Bexar County, Reddick et al. seeks to present accurate representations of those with or without broadband access.

Access to broadband falls under the purview of the *Social Exclusion Theory* which argues that social exclusion is associated with “exclusion from social participation, cultural and structural processes, opportunities to build human capital, and access to services and power structures” (Reddick, Enriquez, Harris, & Sharma, 2020). As such, access to reliable broadband services clearly limit communities’ ability to access these pieces of social capital. Reddick et al. argue that the digital divide works as a form of social exclusion that leads to “unemployment, poor job skills, low income, poor housing and neighborhoods that lack security and poor family structures” (Reddick, Enriquez, Harris, & Sharma, 2020). They do concede that the creation of the digital divide is likely not the result of purposeful exclusions of groups of people but rather “an unintended outcome of social processes or policy decision makings”.

The findings of Reddick et al.’s study determined that household income was the largest predictor of broadband access. For households earning 20-39 thousand a year, only 73% responded positively to having broadband internet access. That percentage dropped precipitously for those homes earning annual incomes of 20 thousand or less, falling to only 52% of qualifying respondents having broadband internet access (Reddick, Enriquez, Harris, & Sharma, 2020). The group felt that their findings aligned with the social exclusion theory and expressed worry that with the continuation of the COVID-19 pandemic, these already marginalized groups would be left even further behind.

In that same vein of concern for equal access, Brian Witkowski expresses concern for elderly and rural individuals and communities. As rural residents tend to be older and have lower household incomes, they experience decreases in reliable internet access (Witkowski, 2008). This is not simply an issue of the ability to enjoy the same entertainment affordances as those in urban communities, although that does play a role in social exclusion theory. Broadband is a “transformative technology” argues Witkowski, one that improves access to highly important services such as healthcare.

Access to telehealth services would clearly benefit rural communities the most, but without the broadband infrastructure to facilitate such an affordance, many rural communities are forced to suffer “access issues, stemming from acute shortages of healthcare providers and

geographic barriers to care” (Bauerly, McCord, Hulkower, & Pepin, 2019). Communities in rural areas without broadband suffer from statistically poorer health, suffering which is often only overcome once state or federal authorities step in to provide aid in the form of grants or loans.

Physical health is the not only form of health to benefit from increased access to broadband internet services. Robert LaRose, Sharon Strover, Jennifer Gregg, and Joe Straubhaar seek to elucidate the important role internet access plays in mental and social health. The *Impact of rural broadband development: Lessons from a natural field experiment* demonstrates how broadband internet access can allow for socialization and self-betterment that would otherwise be impossible. Reliable internet access in rural communities is tied to increased social linkages and community attachments, factors that aid in limiting out-migration of younger residents (LaRose, Strover, Gregg, & Straubhaar, 2011).

As a result, rural communities with solid broadband access suffer from less economic issues, as labor forces maintain youthful participation. But such positive access is still quite rare. As of 2011, only 24 percent of rural adults living outside of metro areas had access to broadband internet, compared to over 39 percent of urban and suburban adults. LaRose et al. assert that to help prevent the decay and loss of youth in rural areas, broadband expansion should seriously be considered.

Conclusion

The scholarship surrounding the Digital Divide, as evidenced in access to Broadband internet throughout the continental United States, is a relatively new endeavor. In the thirty odd years since the very first Broadband studies, the published scholarship on the topic has taken on a few new forms. Initially, study on Broadband was conducted almost entirely through the lens of infrastructural studies. Academics such as Peter Stenberg focused upon the infrastructural history of broadband, detailing the expansion of telecommunication infrastructures in the country. As broadband became more widespread, the data usage of internet use became more demanding, scholars began to shift their study to the economic effects of reliable internet access, detailing the rise of income in areas fitted with broadband networks. In recent years, broadband study shifted tone yet again.

Now as America finds itself in the midst of an ongoing pandemic, the importance of high-speed connection was highlighted once again as individuals struggle to work from the comparative safety of their own homes. Recent scholarship on broadband access has ramped up its language surrounding its widening digital divide, framing the issue as a sociological one rather than economic. That is not to argue, however, that the sociologically focused work of scholars such as Christian Wernick hold greater value over other permutations of broadband studies. To argue that any such form is more valuable than another would be a pointless endeavor. Rather than take such a misguided stance, it has been the aim of this literature review to present the various viewpoints and arguments of each theme. As of writing, it still seems unclear as to when the COVID-19 pandemic might end, and life returns to some sense of normalcy. The shock of recent events has altered how many academics understand the importance of their work.

As the world continues to struggle to gain a sense of normalcy, issues of class and culture are brought to the fore. Telecommunication studies are no different, and it is clear that the trend

of treating the access to broadband services as a sociological issue will persist as scholars continue to analyze the statistics of race, age, gender, and class associated with affordable and reliable internet access. But it will require a holistic effort from each aspect of telecommunication literature to determine the best methods for eliminating the Digital Divide.

Works Cited

- Bauerly, B. C., McCord, R. F., Hulkower, R., & Pepin, D. (2019). Broadband Access as a Public Health Issue: The Role of Law in Expanding Broadband Access and Connecting Underserved Communities for Better Health Outcomes. *Journal of Law, Medicine & Ethics*, 47, 39–42.
- Deller, S., & Whitacre, B. (2019). Broadband's relationship to rural housing values. *Papers in Regional Science*, 2135–2154.
- Dettling, L. J. (2017). Broadband in the Labor Market: The Impact of Residential High-Speed Internet on Married Women's Labor Force Participation. *ILR Review*, 451-482.
- Frost, L., Baskin, M., & Newton, J. (November). Advancing Local Broadband Access: Six Strategies for Success. *Public Management*, 10-13.
- LaRose, R., Gregg, J. L., Strover, S., Straubhaar, J., & Carpenter, S. (2007). Closing the rural broadband gap: Promoting adoption of the Internet in rural America. *Telecommunications Policy*, 359-373.
- LaRose, R., Strover, S., Gregg, J. L., & Straubhaar, J. (2011). The impact of rural broadband development: Lessons from a natural field experiment. *Government Information Quarterly*, 91-100.
- Lobo, B. J., Alam, M. R., & Whitacre, B. E. (2019). Broadband speed and unemployment rates: Data and measurement issues. *Telecommunications Policy*.
- Martins, S. S., & Wernick, C. (2020). Regional differences in residential demand for very high bandwidth broadband internet in 2025. *Telecommunications Policy*.
- Montenegro, L. O., & Araral, E. (2019). Can competition-enhancing regulation bridge the quality divide in Internet provision? *Telecommunications Policy*.
- Preieger, J. E. (2003). The Supply Side of the Digital Divide: Is There Equal Availability In The Broadband Internet Access Market? *Economic Inquiry*, 346-363.
- Reddick, C. G., Enriquez, R., Harris, R. J., & Sharma, B. (2020). Determinants of broadband access and affordability: An analysis of a community survey on the digital divide. *Cities*, 1-12.
- Schneir, J. R., & Xiong, Y. (2016). A cost study of fixed broadband access networks for rural areas. *Telecommunications Policy*, 40(8), 755–773.
- Stenberg, P. L. (2010). *American Policy and the Evolving Broadband Internet Network*. Agricultural & Applied Economics Association.
- Stenberg, P., Morehart, M., & Cromartie, J. (2009). Broadband Internet Service Helping Create a Rural Digital Economy. *Amber Waves*, 22-26.
- Thomas, D., & Finn, A. (2018). Households' valuation of new broadband networks: The impact

of the perceived benefits of and access to e-services. *Internet Research*, 28(3), 675–695.
DOI:<http://dx.doi.org.proxy01.its.virginia.edu/10.1108/IntR-10-2016-0317>

Wikipedia. (2020). Information, People, and Technology. In B. Pursel, *Information, People, and Technology* (pp. 146–158). The Pennsylvania State University Open Resource Publishing.

Witkowski, B. (2008). Bridging the Digital Divide: Improving Broadband Access for Rural Americans. *Public Interest Law Reporter*, 132, 170–177.