

# Broadband Pricing Under BEAD

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By MARK A. JAMISON<sup>†</sup>

*States will provide their citizens with more broadband and better broadband if they take light-handed approaches to price restraints. NTIA has suggested heavy-handed approaches that will be costly, discourage customers and companies from innovating, and disrupt low-income consumers. Lessons from centuries of legal cases, economic studies, and regulatory experiences conclude that prices are best left to competitive markets and regulated prices must be high enough to provide sufficient revenue for continued investment and innovation. States that use effective competitive processes for choosing BEAD funding recipients will be able rely upon those competitive outcomes to adequately fund light-handed price restraints, if they are limited in scope and duration.*

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<sup>†</sup> M. Jamison: American Enterprise Institute, Washington, D.C., and Public Utility Research Center and Digital Markets Initiative, Warrington College of Business Administration, University of Florida, 205 Matherly, Gainesville, Florida 32611 (mark.jamison@warrington.ufl.edu). Disclosure: The author's research center receives funding from companies that have an interest in this topic. The content of this paper is the author's own work and does not represent the opinions of the Public Utility Research Center, the University of Florida, the American Enterprise Institute, or any of center sponsors. The author is responsible for all errors and omissions.

## I. Introduction

Congress created the federal Broadband Equity, Access, and Deployment (BEAD) program, a prominent feature of the Infrastructure Investment and Jobs Act (IIJA),<sup>1</sup> to usher the digital age into areas that have been without modern broadband. Congress expressed a finding that:

“Access to affordable, reliable, high-speed broadband is essential to full participation in modern life in the United States. The persistent ‘digital divide’ in the United States is a barrier to the economic competitiveness of the United States and equitable distribution of essential public services, including health care and education. The digital divide disproportionately affects communities of color, lower-income areas, and rural areas, and the benefits of broadband should be broadly enjoyed by all.”

The IIJA provides \$42.45 billion for planning, infrastructure deployment and adoption programs in all 50 states, Washington D.C., Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands (hereafter, states). The money is distributed to the states by the National Telecommunications and Information Administration (NTIA), an agency within the Department of Commerce. States are to use the money for the purposes outlined in the statute, subject to the law’s numerous requirements, including data speed requirements, processes for submitting plans to NTIA, and working with local governments.

<sup>1</sup> Infrastructure Investment and Jobs Act, Pub. L. No. 117-58 (2021), <https://www.govinfo.gov/app/details/PLAW-117publ58>.

There are disagreements about the amount of subsidy needed to provide access to all of the approximately 24 million Americans (McKinsey, 2022) that do not have access to broadband. Investment professionals knowledgeable about broadband costs and financing are optimistic that, with light-handed regulatory policies, the \$42.45 billion is sufficient to attract enough private capital to fill the gap, but some states believe that gaps will remain (Chaplin, 2023; Dawson, 2023).

Even if the \$42.45 billion is sufficient under light-handed regulation, some NTIA policy choices are heavy handed and threaten the country's ability to fill the 24-million-person gap. For example, NTIA chose to press states to require the use of fiber optics, even though less costly technologies might provide better value in certain circumstances (Connolly, 2022). It also chose to allow states to use inefficient grant systems instead of encouraging the use of auction processes that save money by forcing funding recipients to aggressively compete for business (Rosston, 2023a; Wallsten, 2023).

Also troubling, and the subject of this paper, is NTIA's decision to *de facto* impose regulations on broadband prices, contrary to economic evidence that such regulations would be counterproductive, and contrary to the statute's clear language prohibiting NTIA from regulating prices. NTIA's desired price controls, if followed by the states, will raise the costs of expanding broadband and discourage the development and adoption of advanced broadband capabilities. As a result, rather than ensuring a vibrant broadband future, as Congress envisioned, price controls could waste taxpayer dollars and slow technological progress.

NTIA is pressing states to adopt two price controls that it created. One control is a \$30 per month low-cost service option for eligible consumers for the life of the broadband assets, which would be about 20 years (NTIA, 2023). The IJA states are to require BEAD-funded broadband providers to include low-cost options in their BEAD-area service offerings, and that the NTIA is to establish which consumers qualify for low-cost options. But NTIA has gone beyond this and is

strongly pressing states to adopt a \$30 nationwide price for qualifying customers. By extending the low-cost option for two decades and by denying states the opportunity to develop pricing policies that fit local needs, NTIA is ensuring the low-cost option will be overly costly and counterproductive for at least some consumers, with the result being a stunted broadband market.

The other control is NTIA's middle-class affordability requirement (NTIA, 2023), which the agency created with no Congressional authorization. Without defining what it means by affordability, and without evidence that there are affordability problems for middle-class Americans, the agency is requiring states to create plans for addressing an imagined problem. In contrast to NTIA's forceful approach with the low-cost option, here NTIA requires states to have a middle-class program but does not strongly encourage a specific approach. Instead, NTIA signals that it would like for states to make middle-class households eligible for the low-cost service option, provide these households with direct subsidies, or pressure companies by, for example, state monitoring and evaluation of prices.

Regulation of broadband prices would limit the success of the IJJA. To help states develop effective policies, this paper examines state options and encourages light-handed approaches that incentivize service expansion, adoption, and innovation. It proceeds as follows. The next section describes IJJA's statutory provisions and NTIA's price-control policies. Section III summarizes lessons from past price controls and the proper legal and economic principles for price limits. Section IV uses these principles to present and analyze state options. The last section is the conclusion.

## **II. Statutory Provisions and NTIA's Policies**

Congress was specific that it did not want NTIA regulating prices, stating that "nothing in this title may be construed to authorize the [NTIA] to regulate the rates

charged for broadband service.”<sup>2</sup> The only provisions for NTIA involvement in pricing are with respect to the low-cost option where the statute says that each funded broadband provider is to offer “not less than 1 low-cost broadband service option for eligible subscribers,”<sup>3</sup> that NTIA will determine who is eligible for low-cost service options, and that each state is to “consult” with NTIA regarding the state’s idea for its low-cost service option before submitting its BEAD plan to NTIA.

NTIA has exceeded what Congress authorized. In its guidance to the states for the low-cost options, NTIA (2023) went beyond the statutory consulting role and “strongly encouraged” states to impose a \$30 per month maximum price for eligible customers, inclusive of all taxes, fees, and charges;<sup>4</sup> that the options do not include data caps, surcharges, or usage-based throttling; and to allow subscribers to upgrade to other low-cost options at no cost if they are available. The requirements would last for the duration of the lives of the broadband assets, which would be about 20 years.

Apparently of its own initiative, NTIA (2023) decided to impose on states a requirement that they develop middle-class affordability plans to “ensure that a BEAD-funded network’s service area provides high-quality broadband service to all middle-class households at reasonable prices.” NTIA declined to explain what it means by “middle class,” “affordability,” or “reasonable,” and declined to provide evidence of affordability problems. NTIA did suggest middle-class plan features. These include:

- Opening the low-cost option to all middle-class households.

<sup>2</sup> Infrastructure Investment and Jobs Act, Pub. L. No. 117-58 (2021), <https://www.govinfo.gov/app/details/PLAW-117publ58>.

<sup>3</sup> Infrastructure Investment and Jobs Act, Pub. L. No. 117-58 (2021), <https://www.govinfo.gov/app/details/PLAW-117publ58>.

<sup>4</sup> This is for subscribers not residing on Tribal Lands. In Tribal Lands the maximum is \$75 per month.

- To the extent some BEAD funds remain unused once states have committed monies for subsidizing network deployments, using those funds for subsidies targeted to middle-class households.
- Imposing structural competition requirements on funded providers.
- Instituting price and other service benchmarks to guide consumer choices.
- Continuously monitoring prices and reporting them to the public.

NTIA also declined to explain what it means by “structural competition,” describe what constitutes legitimate benchmarks, and explain the presumed linkage between monitoring prices and ensuring that they are affordable.

### **III. Pricing Principles**

Legal and economic principles for legitimate and effective price regulation polices should guide states’ thinking on whether to oversee prices and, if they do, how to design effective mechanisms. Unless states follow such principles, Americans will get less broadband for their money and innovations will be delayed.

Case law and statutes applied to regulated companies often hold that regulated prices must be reasonable. “Reasonable” typically means prices should not be unduly discriminatory and must be profitable for suppliers. Courts began developing these standards in the Middle Ages when certain businesses failed to provide promised services or engaged in unjustified favoritism in the form of price discrimination. The businesses in these cases were ones that provided services generally considered essential for citizens to participate in the economy and where customers were particularly vulnerable if they were refused service or discriminated against. It appears that price levels were not at issue in the cases (Payton, 1981).

Price levels emerged as issues in the U.S. as courts and legislative bodies grappled with the challenges of monopoly markets. The businesses involved were

ones such as utilities, where governments had created barriers to competition (Trebing, 2001). According to the case law that developed, government limitations on prices or government-imposed service obligations had to be commercially viable – meaning that the business needed an opportunity for cost recovery plus a reasonable profit – unless the government provided a subsidy (Jamison, 2011; Kahn, 1998; Payton, 1981; Phillips, 1993). This profitability standard also applied to price controls on individual services even if the enterprise was profitable overall, i.e., governments were not allowed to impose a price constraint on an individual product under the premise that the business was profitable enough to afford it.<sup>5</sup>

The economic standards for price constraints are consistent with these legal principles. Lessons from economics include:

1. **Unregulated prices perform better than regulated prices when competition is allowed.** Economic studies generally find that regulation of prices is best left to markets unless there are significant barriers to competition. For example, rent controls have led to housing deterioration, property abandonment, underinvestment, and misallocation of resources (Glaeser and Luttmer, 2003; Moon and Stotsky, 1993). Deregulating telecommunications in the US in the 1980s and 1990s resulted in lower prices, improved productivity, and more innovations (Crandall and Ellig, 1997). Likewise, deregulation of airlines brought about lower fares that aligned more closely with costs, an increased range of price-quality options, improved efficiency, and a decline in accident rates (Kahn, 1988). Indeed, the general lessons from industry deregulation in the U.S. are that reliance on market forces rather than government control results in lower prices, service quality that better aligns with consumer preferences, and products and prices evolving as technologies and consumer preferences change

<sup>5</sup> *Northern Pacific Railway Co v North Dakota* 236 U S 585 (1915).

(Crandall and Ellig, 1997). And although proponents of regulation generally see price control as a simple way to benefit consumers, as Alfred Kahn observed, the reality is that regulation is often more costly than the perceived market flaws it is intended to correct (Rose, 2012).

2. **When price constraints are imposed, they must allow normal profit levels.** If the government chooses to regulate all prices of a firm, revenues must be adequate to allow cost recovery and attract ongoing investment, meaning that profits must be sufficient to attract investors. The methods for determining revenue adequacy are complex and informationally demanding (Bonbright, 1966; Jamison, 2011). If the government regulates a subset of the firm's prices, then the price constraint must be no less than the firm's incremental costs of providing service, which includes the production costs, the effects of the production on the profitability of the firm's other products (Baumol, 1979), and a contribution to the recovery of the firm's overhead costs sufficient to ensure an efficient market structure (Jamison, 1999).

The information and analytical requirements for ensuring proper individual price constraints are demanding and the practices are prone to error (Jamison, 1989; Jamison, 2002; Kahn, 2004). For example, the FCC established an incremental cost standard for pricing inputs sold to rivals, but erred in how the costs were to be estimated, resulting in prices that were not fully compensatory (Kahn, 2004). One consequence of these inadequate prices was that wholesale services were undersupplied and there were fewer market entrants than would have been with more adequate prices (Gentry et al., 2008; Hauge et al., 2009; Jamison 2004).

3. **Prices should be adequate to encourage entry.** It is tempting to believe that government overseers can emulate competition by establishing cost bases for prices. That belief is incorrect. Governments lack sufficient information as such is revealed only through interactions between

consumers and businesses in an open market. Also, regulation necessarily reflects political considerations that often trump economic realities, resulting in inefficiencies and often poor service for consumers (Moon and Stotsky, 1993). Also, experiences in regulation and deregulation in the U.S. have demonstrated that markets outperform regulation in terms of optimal prices, efficiency, and innovation (Crandall and Ellig, 1997; General Accounting Office, 1990; Grimm and Winston, 2000).

4. **If prices are regulated, service providers should be allowed flexibility to change price levels and price relationships as markets evolve.** It is tempting for governments to control individual prices, believing that this protects customers. But research and decades of experience have shown that individual controls deny customers and service providers opportunities to demonstrate which services are best to provide, who should provide them, and who should consume them (Crandall and Ellig, 1997). Allowing price flexibility allows market interactions that create information about service value and costs. Price flexibility can result in greater innovation, allow firms and customers to adapt to changing industry conditions, and allow price relationships to change as customer preferences change (Sappington and Weisman, 2010).

#### **IV. Implications for States**

The discussion in the previous section describes lessons from common law and economics regarding the proper role and methods for price constraints. This section explains how these principles inform how states might develop their BEAD practices.

**States should use efficient, competitive processes for determining who will receive BEAD funding, for what, and how much.** That prices must be commercially viable is a primary lesson from economic theory, empirical analyses, and practical experience. Thus, if any prices are constrained to be below their costs as defined in Section III, a subsidy is needed. BEAD is designed to fund such subsidies, but ineffective competitive processes will hinder success. For example, if a broadband company believes it will cost \$100 million to serve a BEAD area and that customers would pay \$75 million for the services, the provider's minimum bid for BEAD money would be \$25 million. But if the state BEAD policies are vague on service requirements, pricing requirements, or both, the provider won't know what its costs or revenues might be. This makes participation in BEAD risky, and the company would require more than \$25 million because of these risks.

To be effective, the competitive process used to allocate BEAD funding must be specific as to what is expected of broadband providers; clear as to regulatory constraints, including restrictions on pricing; and credible regarding the commitments the government makes. Vagueness and uncredible commitments create investment risks. As a result, capital markets would demand higher potential returns, which would make the BEAD program more costly.

Also, a primary reason for using competitive processes is to ensure that funding applicants receive no more subsidy than is necessary. Achieving this objective requires an emphasis on bidding subsidy amounts and multiple bidding rounds. Emphasizing these features presses bidders to reveal the minimum amount of subsidy that they need to provide high-quality broadband service. Generally, in a competitive bidding process, bidders are cautious about revealing how much they are willing to pay. This caution results from the bidders' desires to get the best deal possible. In the case of a BEAD subsidy, the bidders will be cautious about revealing how much subsidy they need, and so will overstate their needs if possible. Emphasizing requested subsidy amounts when evaluating bids emulates price

competition in a normal market. And using multiple bidding rounds shows bidders how low they must go to win the competition (Rosston, 2023b).

**States should adopt low-cost options that require limited subsidies and that transition easily as market conditions change.** The NTIA's low-cost plan of \$30 per month and no data caps is overly costly and will create difficult transitions. The plan is overly costly because low-income households are generally not price sensitive when it comes to purchasing broadband. Indeed, studies and experiments have shown that the most effective programs for promoting broadband for low-income households are those that emphasize adapting services to local conditions rather than lowering prices (Rosston and Wallsten, 2020; Wallsten, 2005; Wallsten, 2016). Emphasizing price to affect adoption is not in the best interest of low-income households.

Broad availability of low-cost options is also costly. The NTIA's criteria for determining who is eligible for a low-cost option effectively matches eligibility for the FCC's Affordable Connectivity Program (ACP), which in turn effectively matches the requirements of earlier low-income programs, such as Lifeline (FCC, 2023a; Ukhaneva, 2015). Studies on the cost-effectiveness of such programs find that the lower prices have little effect on service adoption. Indeed, one study found that a Lifeline program provided subsidies to 19 households that didn't need a subsidy for every 1 household that did (Ukhaneva, 2015). This means that the annual subsidy provided to add one low-income household to the network might cost 20 times what is needed, which wastes money that could be used for fulfilling BEAD's stated purposes. So, while a slightly higher low-cost option, say \$31 rather than \$30, might decrease the number of adopters ever so slightly, it would substantially increase the amount of money available for increasing broadband availability.

The \$30 price has other complications. That it is equal to the \$30 benefit under the FCC's ACP means that eligible customers would pay nothing for broadband. This creates at least two problems. One is that it produces a price reference of zero, which would lead at least some consumers to believe that the service has little value and so would decline to subscribe (Gneezy et al., 2014). Another problem is that, for other customers, the match with ACP creates price anchoring at zero. This can make people unwilling to pay non-zero prices in the future (Tversky and Kahneman, 1991), which means that subscriptions could decline unnecessarily when the low-cost option or the ACP expires. Consumer decisions about free products differ from other products because people do not engage in a normal cost-benefit analysis (Shampanier et al., 2007). Thus, while NTIA and states may believe that a \$30 price is helping low-income households, it will in fact harm many of them.

**States should not impose price constraints for middle class customers.** It is unfortunate that NTIA chose to impose middle class affordability plans on states as any such plan is unlikely to improve affordability and is likely to hinder broadband development. This is particularly true of NTIA's suggestion to impose price constraints for middle class customers.

A price constraint for the middle class would not result in any material change in subscribership but would lower provider revenues, thus suppressing system expansion. To illustrate, some investment analysts project that it will cost \$6000 per subscriber to extend broadband to all unserved and underserved areas and that the expected revenue is \$3000 per subscriber, implying that a subsidy of \$3000 per subscriber will be needed from the BEAD program.<sup>6</sup> If these numbers are correct,

<sup>6</sup> See comments of Chaplin (2023).

a middle-class price constraint that decreases subscriber revenues by 10% would imply a \$300 per person increase in BEAD funding requirements.

A middle-class price constraint would also decrease a broadband provider's ability to properly price advanced services and promote new technology adoption. Recall from Section III that deregulation in the 1980s and 1990s resulted in an increased range of price-quality options (Kahn, 1988). Broadband is generally offered using such menus of price, speed, and feature options. This approach allows customers to choose what is right for them. Broadband providers carefully design such menus to ensure that customers who value higher broadband capabilities the most purchase high-end products, and customers that value broadband less purchase slower speeds. For example, suppose the optimal design of a menu of options was to charge \$80 for 1 Gbps (gigabit per second) service and \$55 for 300 Mbps (megabit per second) service. This pricing implies that higher-end customers are willing to pay at least \$25 more for the higher speed than the lower speed, but lower-end customers are not. Now suppose that a state imposed a price control that forced the 300 Mbps service below \$55. To continue to achieve the \$25 price differential, the provider would have to lower its \$80 price for the Gbps service even though it was unregulated. In this way the regulation of some broadband prices necessarily lowers other prices in the menu, resulting in lower profits, a greater need for subsidies, and less revenue for future investment.

The regulation also hinders future innovations. To illustrate, suppose in the future the \$80 service option could include new capabilities made possible by a new technology. As in the previous paragraph, a state suppression of the 300 Mbps price would mean one of two things, or both. One consequence could be that the service provider must charge a lower price for the new capabilities, which would make them less profitable and would delay their introduction. If the operator does not lower the \$80 price, then some customers who would benefit from the new capabilities under normal circumstances would stay with the old technology. Of

course, both negative consequences could happen depending on costs and how customers vary in their valuation of broadband services.

**If a state must adopt a middle-class affordability plan, it should simply compare BEAD-area prices to non-BEAD-area prices and investigate further only if there are inexplicable deviations.** The least damaging of the NTIA’s suggested middle-class programs is the monitoring of prices as this imposes no explicit constraints on market performance. The other options are problematic.

One option – direct subsidies to middle-class households – would have the distortive effects described in the previous two paragraphs as well as a damaging price-anchoring impact, like the one described above in the discussion about the low-cost options. Another option – create “structural competition” – is problematic in part because the NTIA does not explain what it means. Presumably, it means impose obligations on BEAD recipients to create opportunities for rivals. If that is NTIA’s meaning, states should note that such programs have been used before. Empirical evidence on the effects is mixed, but it is largely believed that the efforts were unproductive (Crandall and Ellig, 1997; Kahn, 2004; Woroch, 2004). The NTIA also suggests that state governments guide consumer choices. This, too, is unlikely to be productive as government officials will lack sufficient knowledge of consumer preferences and buying habits.

**Any state price controls should be short lived.** Price commitments for broadband are typically limited to one to five years. For example, Verizon’s promotional prices for business broadband can last from 12 to 60 months, depending on the tier and length of contract, and 12 to 24 months for residential broadband.<sup>7</sup> The specific

<sup>7</sup> See Verizon website <https://www.verizon.com/home/internet/> (accessed November 26, 2023). See also, Capital One (2023).

lengths of time imply the number of months that it takes for new subscribers to integrate Verizon's broadband services into their ways of living or doing business.

One reason for limiting the time for price controls is to constrain the negative financial impacts. For example, if the number of years for constraint were halved, then the revenue impact would be roughly halved, which leaves more money for system expansion.

Overly long duration periods for price constraints have other negative impacts. Longer periods increase risk because the inflexible price constraints limit providers' abilities to adapt to rapidly changing markets and technologies. The higher risk increases providers' cost of financing investment, which in turn implies less broadband from the BEAD money available.

**Any state price limits should be modeled after mechanisms proven valuable in price cap regulation.** States can mitigate negative impacts of price controls by applying price cap methodologies often used by telecommunications and utility regulators (Jamison, 2007; Sappington and Weisman, 2010). There are two features of price cap regulation that would be useful for a state adopting price controls. One is to allow the controlled prices to change on average at the rate of inflation minus an offset, called an X-factor. The FCC's current application of price caps uses an X-factor of 2, which means that the regulated companies are allowed to increase prices on average at the rate of inflation minus two percentage points (FCC, 2023b). Allowing prices to increase in this way is useful because inflation reflects how costs are changing for the average firm in the economy (Bernstein and Sappington, 1998). The X-factor indicates that the FCC believes that telecommunications providers costs are rising two percentage points slower than is typical in the economy.

Another feature of price cap regulation that might be useful is the application of price baskets. If a state chooses to regulate more than one broadband price, service

providers should be allowed to adjust how these prices relate to each other as demand and supply features will change with time. Price cap regulation handles such situations by including multiple services in a single basket and applying the inflation-minus-X restriction to the basket, not individual prices. Service providers are allowed to change prices provided the weighted average change for the basket does not exceed the inflation-minus-X restriction. Typically, prices are weighted by amount of revenue they generate (Jamison, 2011).

**States should use adoption targets, not price controls, to address concerns with market power.** BEAD funding exists because it is cost prohibitive to provide broadband in certain areas without a subsidy. This need for a subsidy implies that it may not be financially viable for a second provider to enter a market where a BEAD recipient is providing service. In such cases the fund recipient would face no direct competition in the present, but probably will as new technologies become economical, such as low-earth orbit satellites and other wireless methods. It will be tempting to adopt price controls in such situations, but that is unlikely to be a productive remedy for all the reasons stated above in this section.

A better mechanism for addressing the potential of market power is to create adoption commitments in BEAD bidding criteria. Adoption commitments control monopolistic behavior because the provider cannot both price monopolistically and achieve broad adoption. These commitments are superior to price controls for at least three reasons. One is that adoption commitments allow prices to change as circumstances change. Adoption targets also accommodate technology change as the commitment stands regardless of technology, whereas prices would be specific to technology features. Finally, adoption commitments can encourage market competition. Price controls limit financial incentives for entry. But the measurement of adoption could incorporate adoption of any provider's service.

Thus, a BEAD-funded provider might find it beneficial to encourage rivals as their success would help the funded provider achieve the adoption goals.

#### **IV. Conclusion**

This paper explains principles that states should apply in choosing whether to impose price constraints on BEAD-funded providers. Light-handed approaches are likely to be the most effective at achieving BEAD goals and benefitting customers. The lessons from centuries of experience and analyses are that prices are best left to liberal markets – markets provide the right incentives for suppliers and incorporate more information into decision making than can government officials – and that, if there are pricing restraints, they need to be high enough to provide sufficient finances for continued investment and innovation. Price constraints, if imposed, should reflect local conditions and should be in place for only short periods of time. Also, constraints should incorporate features of price cap regulation, such as allowing prices to increase on average according to the rate of inflation minus two, and using a basket if multiple services are regulated.

States that use effective competitive processes for choosing BEAD funding recipients will be able rely upon those competitive outcomes to adequately fund the price controls as long as they are limited in scope and duration. Extended scope and duration will increase costs and stifle network expansion.

## References

- Baumol, William J. 1979. "Maximum and Minimum Pricing Principles for Residual Regulation," *Eastern Economic Journal*, Eastern Economic Association, vol. 5(1-2), pages 235-248.
- Bernstein, Jeffrey I. and David E. M. Sappington. 1998. *Setting the X Factor in Price Cap Regulation Plans*. NBER Working Paper No. w6622.
- Bonbright, James C. 1966. *Principles of Public Utility Rates*. New York, NY: Columbia University Press.
- Capital One. 2023. "Introductory rate: What it is and how it works," <https://www.capitalone.com/learn-grow/money-management/introductory-rate/> (accessed November 26, 2023)
- Chaplin, Jonathan. 2023. Comments at The American Enterprise Institute "Will Broadband Be Affordable? Highlights from an Expert Panel," available at <https://www.aei.org/wp-content/uploads/2023/09/231002-Will-Broadband-Be-Affordable-Assessing-Regulations-for-Broadband-Subsidies-transcript.pdf?x91208&x91208>.
- Connolly, Michelle. 2022. Comments at The American Enterprise Institute "Can Billions of Dollars in Federal Grants Solve Broadband Access and Availability Throughout the US?" available at <https://www.aei.org/events/can-billions-of-dollars-in-federal-grants-solve-broadband-access-and-availability-throughout-the-us/>.
- Crandall, Robert, and Jerry Ellig. 1997. *Economic Deregulation and Customer Choice*. Fairfax, Va.: Center for Market Processes, George Mason University. Available online at: [http://www.mercatus.org/repository/docLib/MC\\_RSP\\_RP-Deregulation\\_970101.pdf](http://www.mercatus.org/repository/docLib/MC_RSP_RP-Deregulation_970101.pdf).

Dawson, Doug. 2023. "If BEAD Isn't Enough," The Benton Foundation: Washington, D.C. available at <https://www.benton.org/headlines/if-bead-isn%E2%80%99t-enough>.

Federal Communications Commission. 2023a. "Affordable Connectivity Program." <https://www.fcc.gov/acp>.

Federal Communications Commission. 2023b. "Tariffs." <https://www.fcc.gov/general/tariffs-0>.

General Accounting Office. 1990. "Railroad Regulation: Economic and Financial Impacts of the Staggers Rail Act of 1980." Washington, D.C.

Gentry, Richard, Janice Hauge, and Mark A. Jamison. 2008. "Bureaucrats as Entrepreneurs: Do Municipal Telecommunications Providers Hinder Private Entrepreneurs?" *Information Economics and Policy*, 20(1): 89-102.

Glaeser, Edward, L., and Erzo F. P. Luttmer. 2003. "The Misallocation of Housing Under Rent Control." *American Economic Review*, 93 (4): 1027-1046.

Gneezy, Ayelet, Uri Gneezy, and Dominique Oli  Lauga. 2014. "A Reference-Dependent Model of the Price-Quality Heuristic." *Journal of Marketing Research* 51:2, 153-164.

Grimm, Curtis, and Clifford Winston. 2000. "Competition in the Deregulated Railroad Industry: Sources, Effects, and Policy Issues." In *Deregulation of Network Industries: What's Next?* Sam Peltzman and Clifford Winston, eds. Washington, D.C.: Brookings Institution Press.

Hauge, Janice, Mark A. Jamison and R. Todd Jewell. 2009. "A Consideration of Telecommunications Market Structure in the Presence of Municipal Provision: The Case of U.S. Cities." *Review of Industrial Organization*, 34(2):135-152.

Jamison, Mark A. 1989. "Developing Regulatory Costing Methodologies for Evolving Markets." In *Proceedings of the Bellcore and Bell Canada Industry*

*Forum on Telecommunications Costing in a Dynamic Environment*. Montreal: Bell Canada and Livingston: Bellcore.

Jamison, Mark A. 1999. *Industry Structure and Pricing: The New Rivalry in Infrastructure*, Boston: Kluwer Academic Publishers.

Jamison, Mark A. 2002. "The Role of Costing as a Ratemaking Tool in an Environment of Dynamic Change." In *The Institutional Approach to Public Utilities Regulation*, ed. Edythe Miller and Warren J. Samuels, 250-75. East Lansing: Michigan State University Press.

Jamison, Mark. A. 2004. "Effects of Prices for Local Network Interconnection on Market Structure in the U.S." In *Global Economy and Digital Society*, ed. Erik Bohlin, Stanford L. Levin, Nakil Sung, and Chang-Ho Yoon, 301-20. Amsterdam: Elsevier Science.

Jamison, Mark A. 2007. "Regulation: Price Cap and Revenue Cap." In *Encyclopedia of Energy Engineering and Technology Vol. 3*, ed. Barney Capehart, 1245-51. New York: CRC Press, Taylor and Francis (updated 2014).

Jamison, Mark A. 2011. "Liberalization and Regulation of Telecoms, Electricity, and Gas in the United States." In *International Handbook of Network Industries: The Liberalization of Infrastructure*, ed. Matthias Finger and Rolf W. Künneke, 366-383. United Kingdom: Edward Elgar.

Kahn, Alfred E. 1988. "Surprises of Airline Deregulation." *The American Economic Review*, 78(2), 316–322.

Kahn, Alfred E. 1998. "Letting Go: Deregulating the Process of Deregulation." East Lansing, MI: Michigan State University.

McKinsey. 2022. "Are states ready to close the US digital divide?" <https://www.mckinsey.com/industries/public-sector/our-insights/are-states-ready-to-close-the-us-digital-divide#/> (accessed November 15, 2022).

Moon, C. G., and Stotsky, J. G. 1993. The Effect of Rent Control on Housing Quality Change: A Longitudinal Analysis. *Journal of Political Economy*, 101(6), 1114–1148.

National Telecommunications and Information Administration. 2023. *Broadband Equity, Access, and Deployment (BEAD) Program: Initial Proposal Guidance*. [https://broadbandusa.ntia.doc.gov/sites/default/files/2023-10/BEAD\\_Initial\\_Proposal\\_Guidance\\_Volumes\\_I\\_II\\_10-2023.pdf](https://broadbandusa.ntia.doc.gov/sites/default/files/2023-10/BEAD_Initial_Proposal_Guidance_Volumes_I_II_10-2023.pdf).

Payton, Sallyanne. 1989. “The Duty of a Public Utility to Serve in the Presence of Competition.” In *Applications of Economic Principles in Public Utility Industries*, Werner Sichel and Thomas G. Gies, eds. Ann Arbor, MI: University of Michigan.

Phillips, Charles F. Jr. 1993. “The Regulation of Public Utilities.” Arlington, Virginia: Public Utilities Reports, Inc.

Rose, Nancy L. 2012. “After Airline Deregulation and Alfred E. Kahn.” *American Economic Review*, 102 (3): 376-80.

Rosston, Greg. 2023a. Comments at The American Enterprise Institute “Where’s the Broadband Money Going? Tracking Impact and Accountability,” available at <https://www.aei.org/events/wheres-the-broadband-money-going-tracking-impact-and-accountability/>.

Rosston, Greg. 2023b. “Making the Most of Federal Funds.” American Enterprise Institute <https://youtu.be/Q8JMWBrrhmk>.

Rosston, Greg L., and Wallsten, Scott J. 2020. *Increasing low-income broadband adoption through private incentives* (White paper No. 20-001). Stanford Institute for Economic Policy Research. <https://siepr.stanford.edu/publications/working-paper/increasing-low-income-broadband-adoption-through-private-incentives>

Sappington, D.E.M., and D. L. Weisman. 2010. “Price cap regulation: what have we learned from 25 years of experience in the telecommunications industry?”. *Journal of Regulatory Economics* 38, 227–257.

Shampanier, Kristina, Nina Mazar, and Dan Ariely. 2007. "Zero as a Special Price: The True Value of Free Products." *Marketing Science* 26(6): 742-757.

Trebing, Harry M. 2001. "On the Changing Nature of the Public Utility Concept: A Retrospective and Prospective Assessment." In *Economics Broadly Considered: Essays in honor of Warren J. Samuels*, eds. Jeff E. Biddle, John B. Davis, and Steven G. Medema, 259-278. London, United Kingdom: Routledge.

Tversky, Amos, and Daniel Kahneman. 1991. "Loss Aversion in Riskless Choice: A Reference-Dependent Model." *The Quarterly Journal of Economics*, 106(4): 1039–1061.

Ukhaneva, Olga. 2015. "Universal Service in a Wireless World." Georgetown University working paper.

Wallsten, Scott. 2005. *Broadband penetration: An empirical analysis of state and federal policies* (Working paper No. 05-12). AEI-Brookings Joint Center for Regulatory Studies. [https://www.heartland.org/\\_template-assets/documents/publications/17468.pdf](https://www.heartland.org/_template-assets/documents/publications/17468.pdf)

Wallsten, Scott. 2016. *Learning from the FCC's Lifeline broadband pilot projects*. TPRC 44th Research Conference on Communication, Information and Internet Policy. <https://doi.org/10.2139/ssrn.2757149>

Wallsten, Scott. 2023. Comments at The American Enterprise Institute "Where's the Broadband Money Going? Tracking Impact and Accountability," available at <https://www.aei.org/events/wheres-the-broadband-money-going-tracking-impact-and-accountability/>.

Woroch, Glenn A. 2004. "Open Access Rules and Equilibrium Broadband Deployment." In: Cooper, R., Madden, G. (eds) *Frontiers of Broadband, Electronic and Mobile Commerce. Contributions to Economics*. Physica, Heidelberg. [https://doi.org/10.1007/978-3-7908-2676-0\\_14](https://doi.org/10.1007/978-3-7908-2676-0_14)