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The Broadband Stimulus: A Rural Boondoggle and Missed Opportunity

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Abstract: The American Recovery and Reinvestment Act included $7 billion for broadband development. We highlight two endemic problems with the rural subsidy programs managed by the National Telecommunications Agency ("NTIA"): 1) There is little economic rationale for subsidizing rural areas; and 2) NTIA's mechanism for selecting projects appears to have been largely incoherent. The rationale for rural subsidies has been debunked by scores of economists – the programs turn out to be inefficient income transfer mechanisms and do not tend to increase subscriptions, but Congress forced NTIA to award subsidies. In its awards, NTIA adopted a system that led to awards differing by more than a factor of 100 in terms of expected cost-effectiveness. Had it adopted a more reasonable framework, many more households could have been connected for the same money, or the same number of connections could have been realized for a fraction of the cost.

I. INTRODUCTION

In 2009, Congress passed the American Recovery and Reinvestment Act ("ARRA" or "Recovery Act").[1] Among the goals of

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[1] American Recovery and Reinvestment Act of 2009 (Stimulus Bill) Pub.L. 111-5, Feb. 17, 2009, 123 Stat. 115 (codified as amended in scattered sections of 6, 19, 26, 42, and 47 U.S.C.).

the Recovery Act was short-term stimulus: "(1) To preserve and create jobs and promote economic recovery; (2) To assist those most impacted by the recession."[2] The ARRA also had long-term goals of investment in infrastructure: "(3) To provide investments needed to increase economic efficiency by spurring technological advances in science and health. (4) To invest in transportation, environmental protection, and other infrastructure that will provide long-term economic benefits."[3]

The Recovery Act included $7 billion for broadband development: $2.5 billion through the Rural Utilities Service ("RUS") and $4.7 billion for the Broadband Technology Opportunities Program ("BTOP") administered by the National Telecommunications Information Agency ("NTIA").[4] These broadband programs more easily fit within the second set of goals given their long lead time for construction, although both agencies also made efforts to award grants in a rapid manner to provide short-term stimulus.

The law prohibited applicants from receiving money from both the RUS and the BTOP programs: "Provided further, that no area of a project funded with amounts made available under this paragraph [Rural Utilities Service] may receive funding to provide broadband service under the Broadband Technology Opportunities Program."[5] RUS was to provide loans and grants subject to a provision stating, "That priority for awarding funds made available under this paragraph shall be given to projects that provide service to the highest proportion of rural residents that do not have access to broadband service."[6] NTIA, however, had no such clear mandate regarding how to award funds.

In this paper, we focus on three problems with the rural subsidy programs managed by NTIA. First, there is little economic rationale for subsidizing rural areas. Second, even recognizing that political realities might trump economic rationale and cause the political desire to subsidize rural areas, NTIA's mechanism for selecting projects appears to have been largely incoherent. Third, the short-term infrastructure grants and loans could well lead to pressure for long-

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[2] *Id.*

[3] *Id.*

[4] *Id.*

[5] *Id.*

[6] *Id.*

term operating subsidies from the Federal Communications Commission ("FCC").

NTIA has come under scrutiny recently for providing funding for areas that already have broadband.[7] It is important for NTIA to prevent fraud, but the costs of massive inefficiencies in the BTOP program itself almost certainly outweighed losses resulting from fraud.

We assembled a dataset of all of the BTOP grants made by NTIA and found an extremely wide range in the expected cost effectiveness of the grants.[8] Some grantees received more than 30 times as much support as other grantees per mile of fiber deployed, and 100 times as much per new projected broadband connection. While some heterogeneity in cost effectiveness is to be expected, it is not clear that funding some of the least cost-effective projects was a good idea when NTIA likely rejected other, more cost-effective, projects, or could simply have determined that those projects would not pass any reasonable cost-benefit test.[9]

II. WHY RURAL SUBSIDIES ARE INEFFICIENT

Despite the long history of subsidies for rural areas, especially for telephone service, there is no economic justification for these programs. Rural subsidies take money from urban customers and give them to rural residents and companies serving rural residents when such companies have market power. Rosston and Wimmer (2000) show that only a small fraction of money designated to provide service

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[7] *See* Andy Vuong, *Taxpayer-Funded EAGLE-Net Broadband Network May Need More Money*, THE DENVER POST, (Feb. 28, 2013, 1:00 AM), http://www.denverpost.com/business/ci_22683746/taxpayer-funded-eagle-net-broadband-network-may-need; Edward Wyatt, *Waste Is Seen in Program to Give Internet Access to Rural U.S.*, N.Y. TIMES (Feb. 11, 2013), http://www.nytimes.com/2013/02/12/technology/waste-is-seen-in-program-to-give-internet-access-to-rural-us.html?pagewanted=all&_r=0 (noting that some believe EagleNet is overbuilding areas that have service from telephone companies, cable companies, or both).

[8] We attempted to secure data from NTIA on the rejected applications, but NTIA does not make such information readily available.

[9] If NTIA made the information available, we could readily assess the assertion about the relative costs of accepted and rejected applications.

in rural areas goes to low income rural residents.[10] With very low elasticity of demand for telephone service, rural telephone subsidies are inefficient income transfer programs, and they do not generally make transfers to low-income households.

It would be nice to have every household in the country connected to wired broadband service, but connecting households and providing monthly service in the most rural areas is costly, and resources are limited. So, tradeoffs are important. The FCC's National Broadband Plan estimated that it would cost $24 billion to connect all households in the country.[11] It also estimated that connecting the last 250,000 homes would cost $14 billion (of the $24 billion), or $56,000 per household.[12] The implicit message in that document was clear—should that much money be spent on connecting a few homes?

From an economic perspective, subsidy money for rural areas ultimately results in either a transfer to rural landowners or rural service providers. If residents value the improved broadband brought by the subsidies or if the subsidies reduced prices, then landowners could charge higher rent for their land without losing tenants (and they would also have a higher implicit rent if they lived on their own land reflecting the increased value of their property because of the subsidized service). As a result, the subsidy may have reduced the nominal price of the broadband service, but not the cost of living in the rural area and subscribing to broadband.

Despite the overwhelming economic evidence about the inefficiency of rural subsidy programs, Congress forced NTIA and RUS to perpetuate the harm to the economy by requiring subsidies for rural build-out rather than relying on market demand, especially for a service that is "critical" implying a low, and possibly decreasing, elasticity of demand.[13] "The purposes of the program are to—(1)

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[10] Gregory Rosston & Bradley Wimmer, *The "State" of Universal Service*, 12 INFO. ECON. & POL'Y. 3, 261-283 (2000).

[11] FCC, *Connecting America: The National Broadband Plan*, 136 (Mar. 17, 2010), *available at* http://www.broadband.gov/download-plan.

[12] *Id.* at 150.

[13] *See* ROBERT CRANDALL & LEONARD WAVERMAN, WHO PAYS FOR UNIVERSAL SERVICE?: WHEN TELEPHONE SUBSIDIES BECOME TRANSPARENT, BROOKINGS (Brookings Institution 2000); Ross C. Eriksson, David L. Kaserman & John W. Mayo, *Targeted and Untargeted Subsidy Schemes: Evidence from Postdivestiture Efforts to Promote Universal Telephone Service*, 41 J.L. & ECON., 477 (1998); David L. Kaserman and John W. Mayo, "The Quest for Universal Telephone Service: The Misfortunes of a Misshapen Policy," in TELECOMMUNICATIONS POLICY: HAVE REGULATORS DIALED THE WRONG NUMBER? (Donald L. Alexander ed, 1997) (Kaserman and Mayo provide a nice history of the universal service

provide access to broadband service to consumers residing in unserved areas of the United States; (2) provide improved access to broadband service to consumers residing in underserved areas of the United States; (3) provide broadband education, awareness, training, access, equipment, and support . . . ."[14]

A. *Constrained Optimization*

Given a congressional dictate to implement a rural broadband project, NTIA and RUS were forced to operate in a second best world. In a Joint Request for Information ("RFI"), NTIA and RUS asked how they should award a large amount of stimulus money in a way that satisfies the requirements of the Recovery Act.

> Grant Mechanics: The Recovery Act requires all agencies to distribute funds efficiently and fund projects that would not receive investment otherwise.
>
> a. What mechanisms for distributing stimulus funds should be used by NTIA and USDA in addition to traditional grant and loan programs?
>
> b. How would these mechanisms address shortcomings, if any, in traditional grant or loan mechanisms in the context of the Recovery Act?[15]

Procurement awards are notoriously difficult to evaluate because supply offers can differ on a large number of dimensions, such as quality, timing, and coverage, to name a few. As a result, many contracts are awarded arbitrarily with a large degree of subjective

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program); Michael H. Riordan "Universal Residential Telephone Service," in HANDBOOK OF TELECOMMUNICATIONS ECONOMICS 423 (Martin E. Cave, Sumit K. Majumdar, Ingo Vogelsang eds., Vol. 1 2002); Gregory Rosston & Bradley Wimmer, *The 'State' of Universal Service*, 12 INFO. ECON. AND POLICY 261 (2000); Scott Wallsten, *The Universal Service Fund: What Do High-Cost Subsidies Subsidize?*, Technology Policy Institute, (2011), *available at* http://www.techpolicyinstitute.org/files/wallsten%20universal_service_money_trail.final.pdf.

[14] ARRA of 2009, *supra* note 1, at 398.

[15] Notice of Request for Extension of a Currently Approved Information Collection, 74 Fed. Reg. 47, 10716 (Mar. 12, 2009), *available at* http://www.ntia.doc.gov/files/ntia/publications/fr_btop_rfi_090312.pdf.

evaluation and unclear tradeoffs between different attributes. However, certain selection mechanisms can increase the efficiency of grant awards.

In response to the NTIA/RUS RFI, a group of seventy-one economists (including the authors of this Article) submitted comments in an effort to provide an efficient framework for disbursing the broadband stimulus money.[16] In that filing, we discussed the time, costs, and inefficiency of the traditional government procurement process. We also noted that the traditional process has difficulty comparing different types of projects in a coherent way. For example, one company might propose connecting homes via fiber whereas another might propose covering the same homes with wireless. How should the agencies choose which project to fund? Finally, the traditional grant selection process has no real ability to get firms to bid the minimum amount truly necessary to provide service. To overcome these problems, we proposed an auction process to create an objective framework that could be implemented rapidly, allow for cross-technology comparisons, and minimize the amount spent to provide service.[17] To run this auction, NTIA would first define the geographic areas eligible for subsidies and the broadband objective it wishes to achieve in those areas. Then, firms and other eligible entities could bid for the subsidy necessary to make that service profitable.

While an auction process would remove some flexibility from the decision process, it would have required NTIA to come up with objective measures to compare grants, thereby speeding the process and allow explicit tradeoffs between different characteristics. For example, NTIA could have given more weight to fiber optic infrastructure than to slower wireless proposals. Such rules would force NTIA to make explicit any cost tradeoff – for example, fiber might have a weighting of 1.5 compared to wireless so that a fiber project could still be chosen even if it were up to 50 percent more costly than the wireless project. Determining the "correct" tradeoff would not have been easy, but failing to address the issue upfront would not eliminate the problem. Without making tradeoffs explicit, NTIA would simply have to make those tradeoffs in an opaque and ad-hoc manner.

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[16] Paul Milgrom et al., *Comments of 71 Concerned Economists: Using Procurement Auctions to Allocate Broadband Stimulus Grants* (2009), http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1377523.

[17] *Id.*

One thorny issue for rural universal service is that often only a single entity is willing to serve an area.[18] As a result, it is hard to get truthful revelation of the firm's costs, and to get the firm to act efficiently with prevalent subsidies. Because BTOP grants were a one-time event and were available across the country, they presented a great opportunity to see how auctions could be used to create competition *across* areas to serve as competitive discipline and encourage firms to reveal their true willingness to serve.

Under the FCC's Universal Service Program Connect America Fund (originally called the High Cost Fund), eligible firms generally receive subsidies based on estimated costs regardless of anyone else's estimated costs. Our proposal for BTOP competitive bidding would base support on the cost (as measured by its bid for subsidy) of the marginal supplier and use competition to increase efficiency. So, for example, even though only a single entity might be willing to serve a rural area in Texas, that firm would have to compete with firms that were willing to provide service in rural North Carolina and rural Montana. As a result, that firm would place a bid reflecting its cost since the auction design would reward it based on the marginal firm's cost, and all firms with lower costs would have their projects selected and no firms with higher costs would be funded.

If the goal of the program is to connect as many otherwise unconnected people as possible, then grants should be awarded on the basis of cost-effectiveness. If the relevant measure were, say, dollars per household, then areas with the lowest cost per household would receive the subsidy. The location of the grant, therefore, should not matter to the decision. A grant that would connect rural North Carolinians for $100 per person should be funded before a grant that would connect a rural Texan for $700 per person. In other words, the government should use its money to offer connections to the most people, and if it can pass seven times as many people in North Carolina for the same amount of money as it would spend for people in Texas, it should do so.

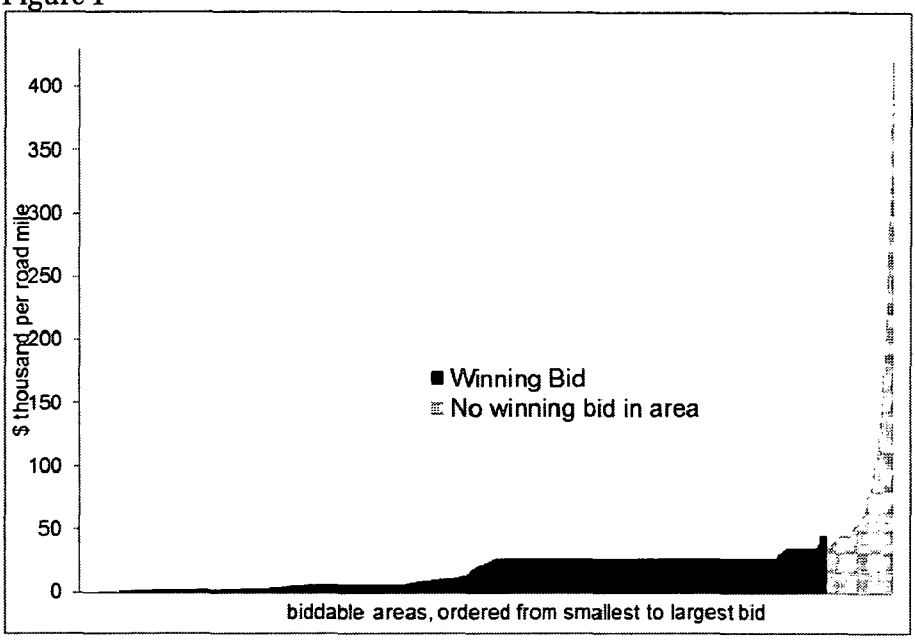
B. *The FCC's Mobility Auction*

The FCC recently demonstrated that the type of auction we proposed is feasible. Wallsten (2013) provides an extensive analysis of

[18] Entrants are often deterred even from places that could otherwise support competition because of the presence of a subsidized competitor.

the FCC's recent "mobility auction."[19] In that auction, the FCC had companies bid to provide wireless coverage. The bids were ranked according to their cost per road mile. While road miles may not have been the best metric, it was announced in advance and companies from different geographic areas competed against each other for the limited ($300 million) subsidy money. Figure 1 below shows the areas that received bids in the auction. The areas in black, where the graph is fairly flat, were awarded subsidy grants. The areas in gray, where the graph increases substantially, were not awarded subsidies because they were more expensive, in some cases much more expensive, than the winning areas.

Figure 1



The graph above tells part of the story—that there were some very high bids that were not accepted, allowing the mobility fund to cover more areas. In addition, the table below shows that in areas that had multiple bidders, the low cost bidders were substantially more cost effective than their direct competitors. In these areas alone, the

[19] Scott Wallsten, *Two Cheers for the FCC's Mobility Fund Reverse Auction*, 11 J. TELECOMM. AND HIGH TECH. L. (forthcoming 2013).

efficiency increase was substantial. In addition, the savings indicate that competition across areas was also efficiency enhancing.

Table 1:
Bids and Total Subsidy Requested by Winning and Losing Bidders in Areas that Received Two Bids

	Average $/Road Mile	Total Subsidy Requested
Winning Bidders	**$2,291**	**$14.2 million**
Losing Bidders	**$7,631**	**$47.3 million**

One issue with the structure of the auction is that each bidder was given the face value of its bid. A "pay as bid" auction does not engender truthful revelation among bidders. Many of the bidders on the far left of the graph could have submitted a much higher bid per mile and still received a subsidy. In future auctions, bidders may see this result and adjust their bids upwards. This could be problematic especially if the bidders expect the FCC to continue funding higher and higher cost areas for mobility.

BTOP, however, was a one-shot opportunity, meaning that a simple pay-as-bid auction could have had less downside than it would in a repeated game. The "Revenue Equivalence Theorem" holds that under those circumstances it should not matter whether there is a pay as bid or an all pay auction. The problem with an all pay auction, where each bidder would get the same payment per mile, is that there might be substantial negative publicity at paying more than bidders requested.[20]

III. THE NITA BTOP GRANTS

NTIA did not use an auction or any other systematic mechanism for comparing proposals across geographies or technologies. As expected, it turned out that the NTIA process took fourteen months for the first set of grants and nineteen months for subsequent grants from the signing of ARRA.[21] It is not completely clear why NTIA

[20] *See* Evan R. Kwerel & Gregory L. Rosston, *An Insiders' View of FCC Spectrum Auctions*, 17 J. REG. ECON. 253, 289 (2000) (discussing the perception issues in early spectrum auctions that led in part to the FCC's choice of a simultaneous multiple round ascending auction).

[21] *Program Reports*, NITA.DOC.GOV, http://www2.ntia.doc.gov /BTOP-Reports#evaluation.

rejected using a more systematic and objective approach, although it is likely that retaining tight control over where money flowed made it easier for the agency to keep politicians in Congress with oversight authority happy.[22]

A. *Selection Criteria*

To be funded, a proposal must advance at least one of five "statutory purposes"[23] and fit into one of the three categories of grants: Sustainable Broadband Adoption (SBA); Public Computing Centers (PCC); and Broadband Infrastructure grants.[24] Beyond meeting a "statutory purpose," the grant applications were subject to numerous eligibility factors and evaluation criteria.

To pass the first round of the selection process, a grant was required to show that all its grant funding would go towards eligible expenses (some expenses such as general operating expenses or expenses prior to the application date were not eligible), that a twenty percent funding match was provided by non-federal sources or a waiver for this requirement was met, evidence that the project would not be completed "but for" federal funding, and that an application was completed fully and on time.[25] Beyond the first round of the process, multiple and varying criteria were used in evaluating grants, however, the evaluation generally focused on projects' benefits (what level and amount of services would be provided to the public), projects' viability (the technical and organizational feasibility), and sustainability (the likelihood services would continue beyond the life

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[22] *See* Matthew D. McCubbins, Roger G. Noll & Barry R. Weingast, *Administrative Procedures as Instruments of Political Control*, 3 J. L. ECON. & ORG. 243 (1987).

[23] *See* 47 USCA § 1305 (2013) (Explaining the purposes of the American Recovery and Reinvestment Act of 2009 as (1) providing broadband service to consumers in unserved areas; (2) providing improved broadband service to consumers in underserved areas; (3) providing broadband access, education, awareness, training, equipment, and support to community anchor institutions, vulnerable populations, or job-creating facilities in economic development areas; providing broadband service for the purpose of public safety; and (4) stimulating the demand for broadband, economic growth, and job creation).

[24] Notice of Funds Availability, Broadband Technology Opportunities Program & Broadband Initiative Program, 74 Fed. Reg. 130 (July 9, 2009), *available at* http://www.ntia.doc.gov/files/ ntia/publications/fr_bbnofa_090709.pdf.

[25] *Id.*

of the grant).[26] Additional factors considered in the grant process included how quickly the money could be spent ("shovel readiness" in the vernacular of the ARRA era), how the grant might promote broadband for public services such as education and healthcare, the extent to which the grant would collaborate with other stimulus projects in the ARRA, and if the entity requesting the grant qualified as a "socially and economically disadvantaged small business."[27]

Logistically, this selection was to proceed in three stages. First, NTIA would conduct an initial screening of applications to determine whether the simple completion requirements were met. Applications that passed the initial NTIA screen would be reviewed by at least three independent reviewers (more on this below) defined as "peers or expert reviewers who have demonstrated subject matter expertise." Using a numerical-based evaluation, these reviewers would score each project application on its purpose, benefits, viability, sustainability, and other factors. Also, during the second stage, state governments were given an opportunity to rank the eligible projects in their geographic areas based on their own criteria.[28]

After the second stage review, the passing applications were asked for more detailed materials if needed by NTIA and evaluated on "Due Diligence" by NTIA personnel. The last step of the evaluation process was a final evaluation and grant acceptance by the Director of BTOP and the Office of Telecommunications and Information Applications ("OTIA") based on recommendations of the 3-personnel evaluation, the Due Diligence review, the priority ranking of the states, the geographic and technological types of the grants, and the budgetary limits of the BTOP program.[29]

It is unclear how NTIA actually chose which projects to fund. The "panel of experts" used to evaluate each grant was not a group of highly-informed, paid grant evaluators, but instead was a selection of

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[26] Slides from Round 1 Public Workshops on the application process, NTIA, July 7-24, 2009, at slides 12-14, *available at* http://www2.ntia.doc.gov/documents/NTIABTOP0721.pdf.

[27] *Id.* at slides 7-11, 13.

[28] One of the authors, Rosston, was asked to serve as an "expert" reviewer by the State of California. After looking at the scope of the projects, room for subjective scoring, his own lack of expertise in evaluating such projects, and the arbitrariness of the process, he declined to participate in the evaluation process.

[29] Notice of Funds Availability, Broadband Technology Opportunities Program & Broadband Initiative Program, 74 Fed. Reg. 130 (July 9, 2009), *available at* http://www.ntia.doc.gov/files/ntia/publications/ fr_bbnofa_090709.pdf.

volunteers who were accepted on a "first-come, first-served" basis.[30] The only qualifications needed to apply for a volunteer position were expertise or experience in one of the following areas: (1) the design, funding, construction, and operation of broadband networks or public computing centers; (2) broadband-related outreach, training, or education; (3) innovative programs to increase the demand for broadband services. [31] Volunteers also had to agree to comply with the Department Commerce rules for conflict of interest and confidentiality.[32]

In addition, there is some doubt about the extent to the completion of the pre-evaluations performed by NTIA given reports such as the following from the State of California:

> Originally, the federal departments of agriculture and commerce were going to determine which applications were viable and then forward them to the state for ranking, but last week federal officials said the state would have to do an initial review on its own, said Joe Camicia, chief of staff in the Office of the State Chief Information Officer.[33]

The second round of BTOP funding, which began in 2010 and allocated the remaining dollars of BTOP funds to eligible projects, had minor changes in the selection process which included reduced initial eligibility requirements, fewer panel experts for each grant, and

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[30] The initial press release asking for volunteers has been removed from the NTIA broadbandusa.com website; however, copies of this request can be found at http://www.freedomtechnologiesinc.com/ntiawatch/?p=450; http://www.tagtech.org/news/28960/Call-for-Reviewers-Broadband-Technology-Opportunities-Program-BTOP-.htm; *see also* Esme Vos, *NTIA Seeks Volunteers to Evaluate Broadband Grant Applications*, MUNIWIRELESS,COM, (July 8, 2009), http://www.muniwireless.com/2009/07/08/ntia-seeks-volunteers-for-grant-applications.

[31] Esme Vos, *NTIA Seeks Volunteers to Evaluate Broadband Grant Applications*, MUNIWIRELESS (July 8, 2009), *available at* http://www.muniwireless.com/2009/07/08/ntia-seeks-volunteers-for-grant-applications.

[32] *Id.*

[33] *See* Patrick Hoge, *State Ranks Broadband Stimulus Bid*, SAN FRANCISCO BUSINESS TIMES (Sept. 20, 2009, 9:00 PM), *available at* http://www.bizjournals.com/sanfrancisco/stories/2009/09/21/story10.html?page=all.

increased importance for grants with matching funds greater than 30 percent of project cost.[34]

NTIA did not make any clear, ex ante scoring rules and competition amongst grants, nor did it set out any objective metrics for how it would compare grants. There likely were some objective, quantitative scores for different segments of the grant evaluation. However, none were made explicit in advance of the application process, nor were the results of the scores made public. As a result, it is impossible to provide a comprehensive and systematic evaluation of NTIA's implementation of the BTOP program.[35]

B. *High-Level Evaluation*

We have put together a data set of NTIA applications and awards. Infrastructure grants account for nearly ninety percent of the dollars awarded ($3.5 billion of a total of $3.9 billion) so our analysis focuses on that segment of NTIA grants. NTIA received 600 applications for over $13 billion of support for infrastructure, an average of $22 million per project. It ended up awarding $3.5 billion for 123 projects, an average of $28 million per project. Of course, each project is unique so simply comparing the average cost per project provides little information about the cost effectiveness of the projects. Table 2 below shows the applications for grants.

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34 Notice of Funds Availability, Broadband Technology Opportunities Program & Broadband Initiative Program, 75 Fed. Reg. 14, (Jan. 22, 2010), *available at* http://www2.ntia.doc.gov/rules#nofa2.

35 We note that NTIA has contracted for an evaluation of some selected grants by an outside firm, ASR Analytics, LLC (*see* http://www2.ntia.doc.gov/files/fbo_award_notice_d10pd18645_2nd_posting.pdf). However, the projects were selected by NTIA rather than based on a systematic random sample or clear criteria. As a result, we are skeptical that such an evaluation will provide objective information or a reasonable basis for program evaluation.

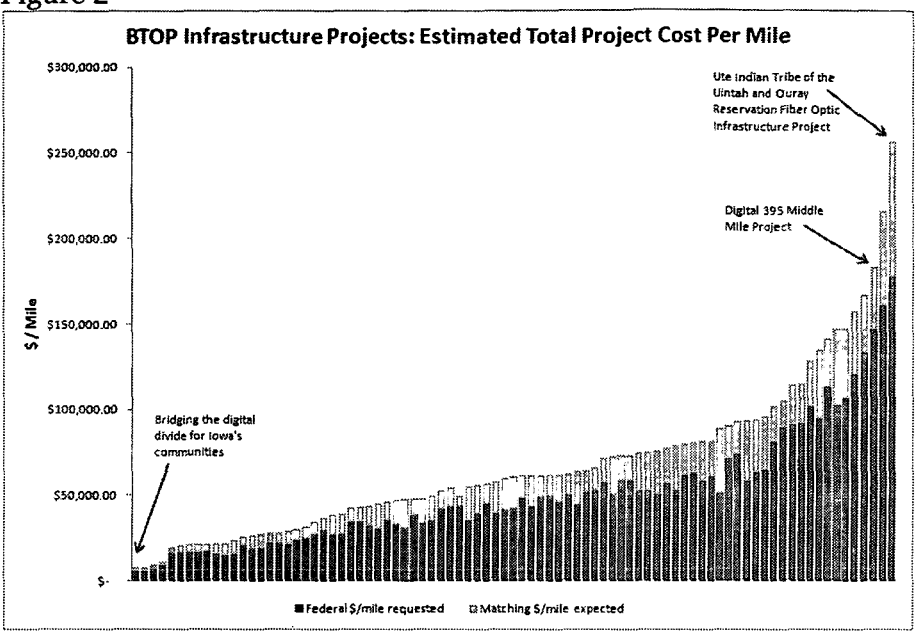
Table 2:
NTIA Grant Applications and Awards (in millions)[36]

	$'s Applied For	$'s Awarded	Awarded Ratio
Infrastructure	$13,319	$3,483	26.2%
Middle Mile Broadband	$2,455	-	-
Middle Mile Fiber	$4,804	$2,883	60.0%
Middle Mile Wireless	$1,037	$156	15.1%
Last Mile Broadband	$1,049	-	-
Last Mile Fiber	$389	$27	7.1%
Last Mile Wireless	$1,908	$32	1.7%
Public Safety	$1,674	$382	22.8%
Public Computing Centers	$2,809	$199	7.1%
Sustainable Broadband Adoption	$3,768	$250	6.7%
Total	$19,897	$ 3,933	19.8%

As shown in F, "Middle Mile Fiber" projects were the bulk of infrastructure projects, accounting for eighty-three percent of the infrastructure projects and over seventy percent of all projects funded. With NTIA information on awarded projects, we calculated the simple average projected cost per mile for each Middle Mile Fiber and Middle Mile Wireless project. The cost projections and mileage estimates come from NTIA and were part of the grant applications, so were, we assume, considered when awarding grants. Figure 2 shows the infrastructure projects that included expected miles covered, arranged from most cost-effective to least cost-effective.

[36] *See Grants Awarded*, NTIA.DOC.GOV, http://www2.ntia.doc.gov/awards (last visited Sept. 6, 2013); *Search Applications*, NTIA.DOC.GOV, http://ssl.ntia.doc.gov/broadbandgrants/applications/search.cfm (last visited Sept. 6, 2013).

Figure 2

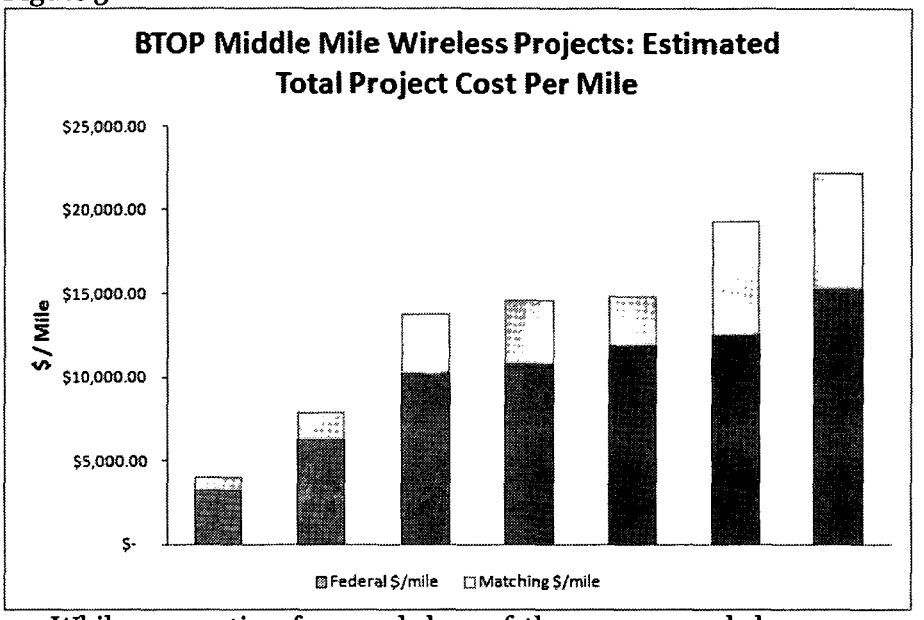


The low cost project is "Bridging the Digital Divide for Iowa's Communities" with a cost of $8,149 per new and upgraded existing mile of fiber. In contrast, the high cost project is "Ute Indian Tribe of the Uintah and Ouray Reservation Fiber Optic Infrastructure Project" with a cost of $256,378 per mile. Fourteen awarded Middle Mile Fiber projects had a projected cost of over $100,000 per mile. While the Ute project only cost $2 million in total, the "Digital 395 Middle Mile Project" was awarded more than $80 million from BTOP, cost over $100 million in total, for a cost per mile of $183,000. The data imply that BTOP spent about $65 million for the most cost-effective 10,000 miles of fiber and close to $820 million for the least cost-effective 10,000 miles.

For Middle Mile Wireless, which may be a substitute for fiber, the low cost project, the "Central North Idaho Regional Broadband Network Expansion" had a cost of about $4,000 per mile, while the high cost project, "Five County Broadband Interconnected Training Access" cost more than $22,000 per mile. However, even the high end of the wireless cost was much lower than many of the fiber projects.

Figure 3 shows the expected cost per mile for the Middle Mile Wireless Projects.[37]

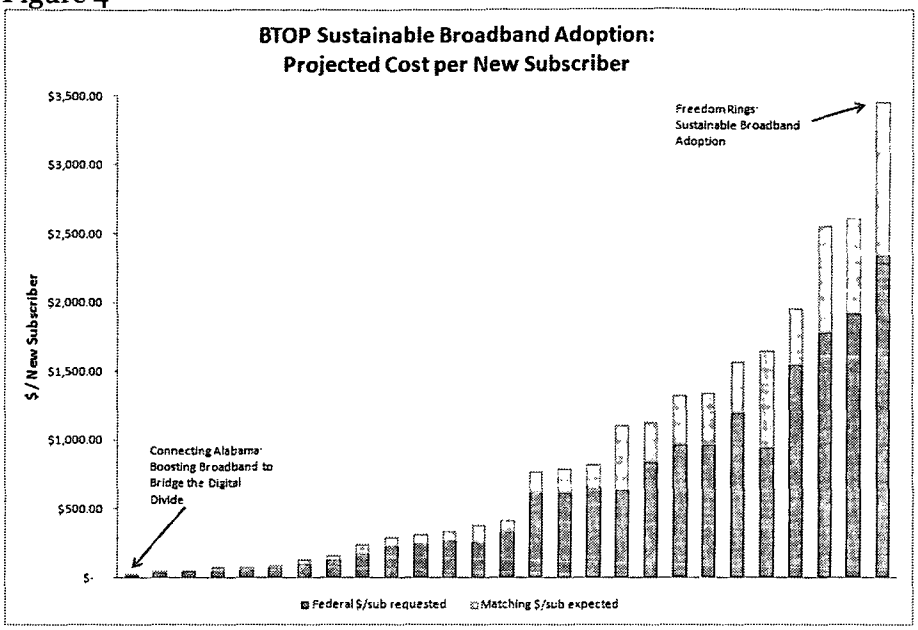
Figure 3



While accounting for much less of the money, such large ranges also appear in the broadband adoption grants (Figure 4).

37 Note, the Middle Mile Wireless projects did not include total projected miles in the public grant applications; therefore, we approximated the total cost per mile from the total dollars spent and total miles deployed as of September, 2012.

Figure 4



The "Connecting Alabama: Boosting Broadband to Bridge the Digital Divide" project cost just under $2 million and was projected to connect over 50,000 new subscribers at a cost of about $30 per connection. The "Freedom Rings: Sustainable Broadband Adoption" project cost $17.4 million to connect a projected 5,050 new subscribers, for a cost per connection of $3,451, a factor of more than 100 times the low end.

These data do not prove that BTOP ignored more cost-effective proposals or that it did not fund the best proposals along some metrics. Truly evaluating NTIA's evaluation mechanism requires information about rejected applications. Unfortunately, NTIA does not make this information available publicly, and quoted us a price of $144,715.09 for the data based on a Freedom of Information Act request we submitted. Without this data it will be impossible for anyone to determine whether BTOP money was spent as effectively as possible, but it would be surprising if some rejected applications did not have lower costs on these metrics. With some projects coming in at extremely high costs, it is important to think about a reasonable cost-benefit analysis for the expenditure of public money. NTIA should make the data available in an easy to access fashion so that it can learn about more efficient ways to spend grant money.

IV. CONCLUSION

The Recovery Act authorized a huge expenditure of public money, in some cases for questionable value. The BTOP program administered by NTIA and RUS falls into the category of money poorly spent. First, there is no economic justification for rural service subsidies, especially for a service that is inelastically demanded and when more efficient ways to target subsidies to low-income households exist. Second, NTIA failed to set up a systematic scoring system to pick the most cost-effective projects. As a result, the available evidence points to a very inefficient outcome – many high cost projects were funded that likely should not have been funded. To make a complete evaluation, NTIA needs to make data available publicly and not simply rely on an outside firm evaluating NTIA's hand-picked projects.