



May 2014

TELECOMMUNICATIONS

USDA Should Evaluate the Performance of the Rural Broadband Loan Program

Why GAO Did This Study

Access to affordable broadband telecommunications is increasingly viewed as vital to economic growth and improved quality of life. Broadband is particularly critical in rural areas, where advanced communications can reduce the isolation of remote communities and individuals. To extend access to broadband and therefore increase economic opportunity in rural America, RUS finances the construction of broadband through a loan program.

GAO was asked to assess issues related to the loan program. This report addresses the (1) geographic distribution and financial performance of loans and (2) relationship between loans and broadband deployment and economic development, and how USDA evaluates progress towards these outcomes.

To address these research questions, GAO interviewed broadband providers and stakeholders selected for their varying experiences, including those that have and have not received RUS loans. GAO also analyzed RUS and U.S. Census Bureau data from 2003—2013 as well as the most recent National Broadband Map data.

What GAO Recommends

GAO recommends that USDA (1) evaluate loans made by RUS through the loan program to identify characteristics of loans that may be at risk of rescission or default and (2) align the goals in its *APR* to the loan program's purpose, to the extent feasible. In commenting on a draft of this report, USDA said it will strive to fully implement the report's recommendations.

View [GAO-14-471](#). For more information, contact Mark Goldstein at (202) 512-2834 or GoldsteinM@gao.gov.

TELECOMMUNICATIONS

USDA Should Evaluate the Performance of the Rural Broadband Loan Program

What GAO Found

The U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) has approved 100 loans to geographically and demographically diverse areas through its Rural Broadband Access Loan and Loan Guarantee Program ("loan program"), though over 40 percent of these loans are no longer active. The geographic distribution of RUS loans is widespread, with broadband providers in 43 states having received one or more loans through the loan program from 2003 through 2013. About \$2 billion in loans have been made to providers in areas with diverse demographics and economies, including areas with low population densities and income as well as areas in relative proximity to large cities with robust local economies. Of the 100 RUS loans approved through the loan program, 48 are currently being repaid, and 9 have been fully paid back. Forty-three are no longer active, either because they were cancelled before they were paid out (25 rescinded) or because the provider defaulted by failing to abide by the terms of the loan (18 defaulted). Approving a loan requires significant resources. Loans that default or are rescinded can represent an inefficient use of RUS resources. Despite these issues, RUS has not gathered information or performed analysis to better understand what might lead a project to default or otherwise make a project a poor candidate for receiving a loan. Federal guidance, though, emphasizes the importance of assessing the risk associated with loan programs.

RUS loans can help promote limited broadband deployment and economic development, but USDA's performance goals do not fully align with the loan program's purpose. According to GAO analysis of National Broadband Map deployment data as of June 2013, areas with RUS loans generally have the same number of broadband providers as areas without a loan. However, the RUS loan program can enhance the quality and reach of broadband networks in rural areas, according to stakeholders. Further, according to GAO analysis of RUS loans and U.S. Census Bureau data from 2003 through 2011—the years for which RUS and relevant Census data are available—areas affected by at least one approved RUS loan were associated with modestly higher levels of employment and payroll (1 to 4 percent) after the year of loan approval and in all subsequent years, as compared to areas that did not receive RUS loans. As stated in the program regulations, the purpose of the RUS loan program is to increase broadband deployment (that is, the number of broadband subscribers with access to new or improved broadband service) and economic opportunity in rural America through the provision of broadband services. USDA's *Annual Performance Report (APR)* provides information on the achievements of USDA's programs each fiscal year. The goals in USDA's report, though, do not fully align with the purpose of the loan program. For instance, USDA's *APR* does not have any goals or measures to determine the loan program's progress towards economic development outcomes. As our past work has shown, an attribute of a successful performance goal is whether it aligns with division and agency-wide goals. Agency performance goals that do not link to program goals can lead to incentives and behaviors that do not support the achievement of division or agency-wide goals. Performance goals aligned with the program's purpose may help USDA and Congress better monitor the outcomes of the loan program.

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Abbreviations

<i>APR</i>	<i>Annual Performance Report</i>
CAF	Connect America Fund
FCC	Federal Communications Commission
ICC	Intercarrier Compensation
NBM	National Broadband Map
OMB	Office of Management and Budget
RUCA	Rural-Urban Commuting Area
RUS	Rural Utilities Service
USDA	U.S. Department of Agriculture
USF	Universal Service Fund

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May 22, 2014

The Honorable Debbie Stabenow
Chairwoman
The Honorable Thad Cochran
Ranking Member
Committee on Agriculture, Nutrition and Forestry
United States Senate

The Honorable Pat Roberts
United States Senate

Access to affordable broadband telecommunications¹ is increasingly viewed as vital to long-term economic growth and improved quality of life, just as electricity, telephone, and interstate highway systems filled similar roles in previous generations. The ability to share large amounts of information at ever-greater speeds increases productivity, facilitates commerce, and drives innovation. Furthermore, broadband can improve citizens' quality of life. For example, broadband technology makes it possible for a patient to visit a local clinic and receive medical attention from specialists hundreds of miles away, for a student to access information not available from the local library, and for a firefighter to download blueprints of a burning building and intervene appropriately. Broadband is particularly critical in rural areas, where advanced communications can reduce the isolation of remote communities and individuals.

To extend access to broadband and therefore increase economic opportunity in rural America, the U.S. Department of Agriculture's (USDA) Rural Utilities Service (RUS) finances the construction of broadband infrastructure through RUS's Rural Broadband Access Loan and Loan Guarantee Program ("loan program"). The repayment status and geographic distribution of loans approved through this program have not been widely reported to date. The relationship, if any, between these loans and desired outcomes such as broadband deployment and

¹The term broadband commonly refers to high speed Internet access. GAO, *Telecommunications: Broadband Deployment Is Extensive throughout the United States, but It Is Difficult to Assess the Extent of Deployment Gaps in Rural Areas*, [GAO-06-426](#) (Washington, D.C.: May 5, 2006).

economic development is also not well understood. Some stakeholders have also expressed concern about the impact of recent Federal Communications Commission (FCC) reforms to the Universal Service Fund (USF) and Intercarrier Compensation (ICC) systems on the RUS broadband loan program.² The USF in particular has functioned as an ongoing subsidy for telecommunications providers, and according to some providers, reductions in USF support could jeopardize the ability of those providers to pay back or take out RUS loans.

You asked us to review the distribution and status of loans as well as the effects of these loans. This report addresses: (1) the geographic distribution and financial performance of loans since 2002; (2) the relationship, if any, between loans and broadband deployment and economic development in rural areas, and how USDA evaluates progress toward these outcomes; and (3) the impact of reforms to the USF High-Cost program and ICC on the RUS broadband loan program.

To examine the geographic distribution and financial performance of loans since 2002, we gathered and analyzed RUS loan data. Specifically, we collected information on the recipient, approval date, amount, repayment status, as well as the proposed technology and communities to be served by the project for each loan approved by RUS since the program's authorization in 2002. We also collected information on the proposed recipient, amount, communities to be served, and technology type for each rejected loan. Using this information, we analyzed the geographic distribution, including whether loans met various definitions of rural, and the repayment status of the loans.

To assess the relationship, if any, between RUS loans and broadband deployment and economic development in rural areas, we conducted statistical analyses and interviews. To assess broadband deployment, we used the most recent National Broadband Map's (NBM)³ data on

²Throughout this report, we refer to entities that have been approved for loans from the RUS loan program as "RUS broadband borrowers." In using this term, we do not refer to borrowers from other RUS loan programs, such as the Telecommunications Infrastructure Loan Program.

³The NBM is an online database that allows users to access broadband availability at the neighborhood level. The NBM was created by the National Telecommunications and Information Administration in collaboration with FCC, and in partnership with 50 states, five territories, and the District of Columbia.

broadband availability to compare the number of providers in counties with approved RUS loan projects to counties with rejected RUS loan projects. NBM data currently available represent broadband availability as of June 2013. We also compared the number of broadband providers in select communities before and after the approval of a RUS loan; we selected these communities as part of our site visits, discussed below. For this analysis, we gathered information on broadband providers present in these communities before the RUS loan from the relevant loan files at USDA, and used NBM information to identify providers after the RUS loan approval.⁴ To examine economic development in rural areas, we developed a regression model to assess the relationship between counties with approved loan projects and specific economic outcomes (i.e., number of business establishments, employment, and annual payroll). We assessed the reliability of RUS data by interviewing RUS officials about their databases and data collection practices. We also assessed the reliability of NBM data by reviewing how the map developers collect data and conduct quality assurance checks, as well as through interviews with stakeholders. Based on this information we determined that these data were sufficiently reliable for our reporting purposes. We also conducted site visits and phone interviews with stakeholders in seven states, which we selected to include communities with providers that have and have not received different kinds of RUS broadband loans.⁵ As part of our site visits we interviewed, when possible, broadband providers, as well as state and local stakeholders such as Chambers of Commerce. We also examined prior academic studies of the RUS loan program as well as other research on the general impact of broadband availability and adoption on communities. We identified these studies through a literature search as well as interviews with stakeholders.

Finally, to determine the impact of reforms to the USF and ICC on the RUS broadband loan program, we reviewed relevant documentation, analyzed USF data, and conducted interviews. We reviewed FCC's 2011 USF/ICC Transformation Order that adopted changes to the USF and

⁴Few loans have been approved since 2008, so we determined that sufficient time had passed for most projects financed with RUS loans to have been substantially completed.

⁵Although we obtained, in our view, information from a diverse mix of RUS borrowers, the findings from our site visits cannot be generalized to all borrowers because the sites were selected as part of a nonprobability sample.

ICC, provided a framework for additional changes, and solicited comments regarding those changes.⁶ We also reviewed public comments on the rulemakings proposed as part of this Transformation Order, as well as studies and reports that assess the impact of the reforms. To calculate the extent of USF support for RUS broadband borrowers, we examined data—for the years 2003 through 2013—reported in FCC’s Universal Service Monitoring Report. We assessed the reliability of these data by reviewing relevant data collection and verification documents. Based on this information, we determined that the data provided to us were sufficiently reliable for our reporting purposes. Additionally, we conducted interviews with officials from RUS, FCC, a private bank (CoBank), and NTCA – The Rural Broadband Association. We also discussed these reforms with nine broadband providers that have and have not received USF support, as described above. Further details about our scope and methodology can be found in appendix I.

We conducted this performance audit from June 2013 to May 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

The provision of broadband Internet infrastructure and services in the United States is generally privately financed. Rural areas, though, can have conditions that increase the cost of broadband deployment, such as remote areas with challenging terrain like mountains, which increase construction costs, or conditions that make it difficult to recoup deployment costs, such as relatively low population densities and incomes.⁷ These conditions make it less likely that a service provider will build out or maintain a network. Low population density can mean fewer potential subscribers, and lower-income populations are less likely to use

⁶*In the Matter of Connect America Fund*, 26 FCC Rcd. 17663, 27 FCC Rcd. 4040 (2011) (report and order and Further Notice of Proposed Rulemaking). In this report we refer to this order as the USF/ICC Transformation Order.

⁷According to FCC, the costs for new fiber broadband construction can range from \$11,000 to \$24,000 per mile for aerial construction and to \$25,000 to \$165,000 per mile for buried construction.

broadband. There is also evidence that rural low-income households are less likely to use broadband than metropolitan low-income households.⁸ As a result of these factors, rural areas tend to lag behind urban and suburban areas in broadband deployment.

However, because of broadband's economic and social benefits, several public programs aim to encourage greater investment in rural areas. RUS administers several such programs intended to accelerate the deployment of broadband services. One program is the Rural Broadband Access Loan and Loan Guarantee Program, which authorizes RUS to provide treasury rate loans, 4 percent loans, and loan guarantees.⁹ The loan program was authorized by the Farm Security and Rural Investment Act of 2002 (2002 reauthorization act) and RUS approved the first loans under the program in fiscal year 2003.¹⁰ On February 6, 2013, RUS published in the *Federal Register* the final rule implementing the loan program,¹¹ as reauthorized in 2008.¹² Entities eligible to receive these loans include corporations, limited liability companies, cooperative or mutual organizations, Indian tribes, and state or local governments.¹³ The

⁸See James Prieger, "The Broadband Digital Divide and the Economic Benefits of Mobile Broadband for Rural Areas" (2012). Pepperdine University, *School of Public Policy Working Papers*. Paper 41.

⁹In fiscal year 2001, RUS was directed by statute to administer a pilot broadband program dedicated in part to finance rural broadband infrastructure deployment (see Agriculture, Rural Development, Food and Drug Administration, and Related Agencies—Appropriations Act, 2001, Pub. L. No. 106-387, title III, 114 Stat. 1549, 1549A-22 (2000)).

¹⁰Pub. L. No. 107-171, § 6103, 116 Stat. 134, (2002), codified at 7 U.S.C. § 950bb. In addition to the Rural Broadband Access Loan and Loan Guarantee Program discussed throughout this report, RUS also has a rural telephone loan program (dating back to 1949, now called the Telecommunications Infrastructure Loan Program) that has historically supported infrastructure for telephone voice service. Additionally, the Distance Learning and Telemedicine Grant Program supports broadband-based applications. RUS also administered the Broadband Initiatives Program authorized as part of the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115, 118-119 (Recovery Act).

¹¹Rural Broadband Access Loans and Loan Guarantees, 78 Fed. Reg. 8353, 8360 (Feb. 6, 2013); codified at 7 C.F.R. part 1738.

¹²The final rule substantially adopts the interim rule published on March 14, 2011. The 2008 act was the Food, Conservation, and Energy Act of 2008, Pub. L. No. 110-246, § 6102, 122 Stat 1651, 1965 (2008).

¹³78 Fed. Reg. 8353, 8360 (Feb. 6, 2013). Throughout this report we refer to entities that provide broadband service, including those eligible for RUS loans, as "providers."

program is “technology neutral” in that RUS can finance any type of broadband service as long as the applicant plans to deliver broadband to every customer in the proposed service area at certain speeds.¹⁴ The loan program was reauthorized by the 2014 reauthorization act, which modified some eligibility requirements and included a new requirement for any entity receiving a loan to submit a semiannual report, for the 3 years after completion of the project, which includes data on broadband adoption rates.¹⁵ According to RUS officials we spoke with, until RUS publishes regulations implementing the changes in the 2014 reauthorization act, it will not accept new loan applications.¹⁶ To administer the loan program, RUS has approximately 22 program staff as well as 25 field staff assisting part-time.

According to RUS rules for the loan program, the service area of a project eligible for RUS broadband financing must be entirely within a rural area, defined for this loan program as any area not contained in an incorporated city or town with a population in excess of 20,000 inhabitants, or an urbanized area contiguous and adjacent to a city or town that has a population greater than 50,000 inhabitants. In addition to being located within a rural area, a service area must meet the following conditions:

- At least 25 percent of the households are underserved, meaning they are offered broadband service by no more than one “incumbent service provider.”¹⁷ Incumbent service providers are broadband

¹⁴These speeds are referred to as the “broadband lending speed,” and are a minimum bandwidth requirement for all loans. The 2014 reauthorization act establishes “the minimum acceptable level of broadband service” as at least 4 megabits per second downstream and 1 megabits per second upstream. At least once every 2 years, the Secretary of Agriculture is required to review and may adjust this speed definition and may consider establishing different minimum speeds for fixed and mobile (wireless) broadband. Agricultural Act of 2014, Pub. L. No. 113-79, § 6104, 128 Stat 649 (2014) to be codified as amending 7 U.S.C. § 950bb(a)(2).

¹⁵*Id.*

¹⁶RUS does not have any pending applications.

¹⁷This requirement was modified by the 2014 reauthorization act to one where not less than 15 percent of the households in the proposed service territory are unserved or have service levels below the minimum acceptable level of broadband service. *Id.* Unserved and underserved areas tend to have conditions that increase the cost of constructing and maintaining broadband networks, and have been defined differently for other federal programs.

providers that RUS identifies as directly providing broadband service to at least 5 percent of the households within a service area.

- No part of the service area has three or more “incumbent service providers.”
- No part of the funded service area overlaps the service area of current RUS borrowers and grantees.
- No part of the funded service area is included in a pending application before RUS seeking funding to provide broadband service.

RUS has a total authorized value of all the loans it can approve each fiscal year, based on lending authority approved in annual appropriations and the estimated long-term cost of extending credit over the life of the loans approved that fiscal year.¹⁸ See table 1 below for yearly authorized total value of loans as well as loans approved.

Table 1: Rural Utilities Service (RUS) Rural Broadband Access Loan and Loan Guarantee Program, Value of Loans, Fiscal Years 2003-2013 (Dollar Figures in Millions)

Fiscal year	Total authorized value of loans	Loans approved ^a	Total value of loans made ^b
2003	\$80	2	\$56.26
2004	\$602	33	\$574.56
2005	\$550	13	\$111.42
2006	\$500	15	\$329.21
2007	\$500	16	\$250.96
2008	\$300	13	\$421.35 ^c
2009	\$400	4	\$6.65
2010	\$400	0	\$0
2011	\$400	1	\$19.75
2012	\$212	1	\$68.9
2013	\$42	2	\$151.77 ^d

¹⁸Budgeting for the cost of credit programs is governed by the Federal Credit Reform Act of 1990 (Pub. L. No. 101-508, title V, 104 Stat. 1388, 1388-610, codified as amended at 2 U.S.C. § 661-661f), which requires federal agencies to receive and obligate budget authority to cover the estimated long-term cost to the government (which includes defaults, delinquencies, and interest subsidies) of providing credit assistance, calculated on a net present value basis, and excluding administrative costs. Beginning in fiscal year 2005, the loan program has received funds that can be carried over into a subsequent fiscal year. In fiscal years 2005 through 2007, the loan program received funds that were available for 2 fiscal years, and since fiscal year 2008, the funds have been no-year money, and are available until expended or rescinded.

Source: GAO summary of RUS data and appropriations acts.

^aSome approved loans are no longer active, either because the borrower has defaulted on its loan payments or the loan was never paid out.

^bThese loan award totals include loans that were later reduced or rescinded. According to RUS officials, RUS did not utilize the entire total authorized amount of loans each year because in some years it lacked enough quality applications.

^cStarting in 2005 Congress allowed RUS to carry over unobligated funds into the following fiscal year—initially for one year, and later, indefinitely. According to RUS, the value of loans approved in fiscal year 2008 includes loan amounts for which the subsidy cost was appropriated in fiscal year 2007 as well as in fiscal year 2008.

^dThe fiscal year 2013 award total is higher than the total authorized value of loans that year because a loan was approved and rescinded during this fiscal year, a situation that allowed RUS to award another loan in the same fiscal year.

RUS loans can have a variety of repayment outcomes. Loans are paid out as eligible project costs are incurred, on an agreed-upon repayment schedule. For the purposes of this report, “active” loans are those that are being paid back by the borrower as scheduled. “Repaid” loans include those that have already been fully paid back. When a loan is never paid out, it is referred to as a “rescission.” Loans can also be reduced from the approved amount, for instance when a borrower does not need the remainder of a loan upon completion of a project. Borrowers can also fail to abide by the terms of the loans, such as missing payment deadlines, which may result in a “default.”

Whereas RUS broadband loans are used as up-front capital to invest in broadband infrastructure, the USF has functioned as an ongoing subsidy for telecommunications providers that offer telephone and other communications services such as broadband access. The USF includes four programs that subsidize these providers.¹⁹ Within the USF program, the largest amount of annual expenditures involve the High-Cost Program, which subsidizes telecommunications providers that serve rural, remote, and other areas where the costs of offering telephone service are

¹⁹Federal policy has long called for making affordable residential telephone service available to the greatest possible number of Americans—a policy known as “universal service.” The Communications Act of 1934 established the nation’s telecommunications policy, including making communications services available “so far as possible, to all the people of the United States.” The USF programs are primarily funded through mandatory payments from companies providing telecommunications services—payments usually passed along to consumers as a line item fee on their telephone bill.

high.²⁰ These subsidies allow providers to charge lower rates than otherwise would be feasible. This support has been a key revenue resource for some telecommunications providers that also offer broadband services, including RUS broadband borrowers.

FCC has adopted program rules that change USF support. These changes are outlined in an order released in November 2011, an order that FCC said “comprehensively reforms and modernizes” the universal service system to ensure that affordable voice and broadband service are available throughout the nation.²¹ This USF/ICC Transformation Order requires that recipients of high-cost support offer voice and broadband as a condition for receiving USF support. FCC also reformed the ICC system. ICC is a system of payments between providers for the origination, transportation, and termination of telecommunications traffic. ICC payments have traditionally been governed by a complex but related system of federal and state rules than those governing universal service.

²⁰The High-Cost Program consists of several components, each with different eligibility criteria and different methods to determine the level of support. We refer to all components when referring to the High-Cost Program throughout this report. The other three USF programs subsidize telecommunication services for low-income consumers (Low Income Program), and telecommunication and broadband services for schools and libraries (E-Rate Program) and for rural health care providers (Rural Health Care Program). We have previously reported on FCC’s efforts to reform the USF High-Cost Program, which will ultimately be replaced by the Connect America Fund. See GAO, *Telecommunications: FCC Has Reformed the High-Cost Program, but Oversight and Management Could be Improved*, [GAO-12-738](#) (Washington, D.C.: July 25, 2012).

²¹USF/ICC Transformation Order, ¶ 1, 26 FCC Rcd., 17667.

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RUS has approved 100 loans, out of 249 applications, through the Broadband Loan Program since 2003. The total dollar amount of the loans awarded to date is about \$2 billion.²² The agency has approved few loans since 2008, including none in fiscal year 2010. RUS officials stated that after the passage of the Recovery Act, RUS focused on administering the Broadband Initiatives Program.²³ Moreover, a lag occurred between the passage of the 2008 reauthorization act and completion of the regulations to carry out the law, in part because of RUS prioritized distribution of Recovery Act funding.

The geographic distribution of RUS loans is widespread, though with more loans going to providers serving the Great Plains, Midwestern and Southern states than to the east and west coasts. Providers in 43 states received one or more loans since 2002 (see fig. 1).²⁴ The states where providers received the most loans include Iowa, Kansas, Minnesota, Oklahoma, and Texas. RUS officials stated that the loan program is intended to be geographically neutral, and they do not target particular

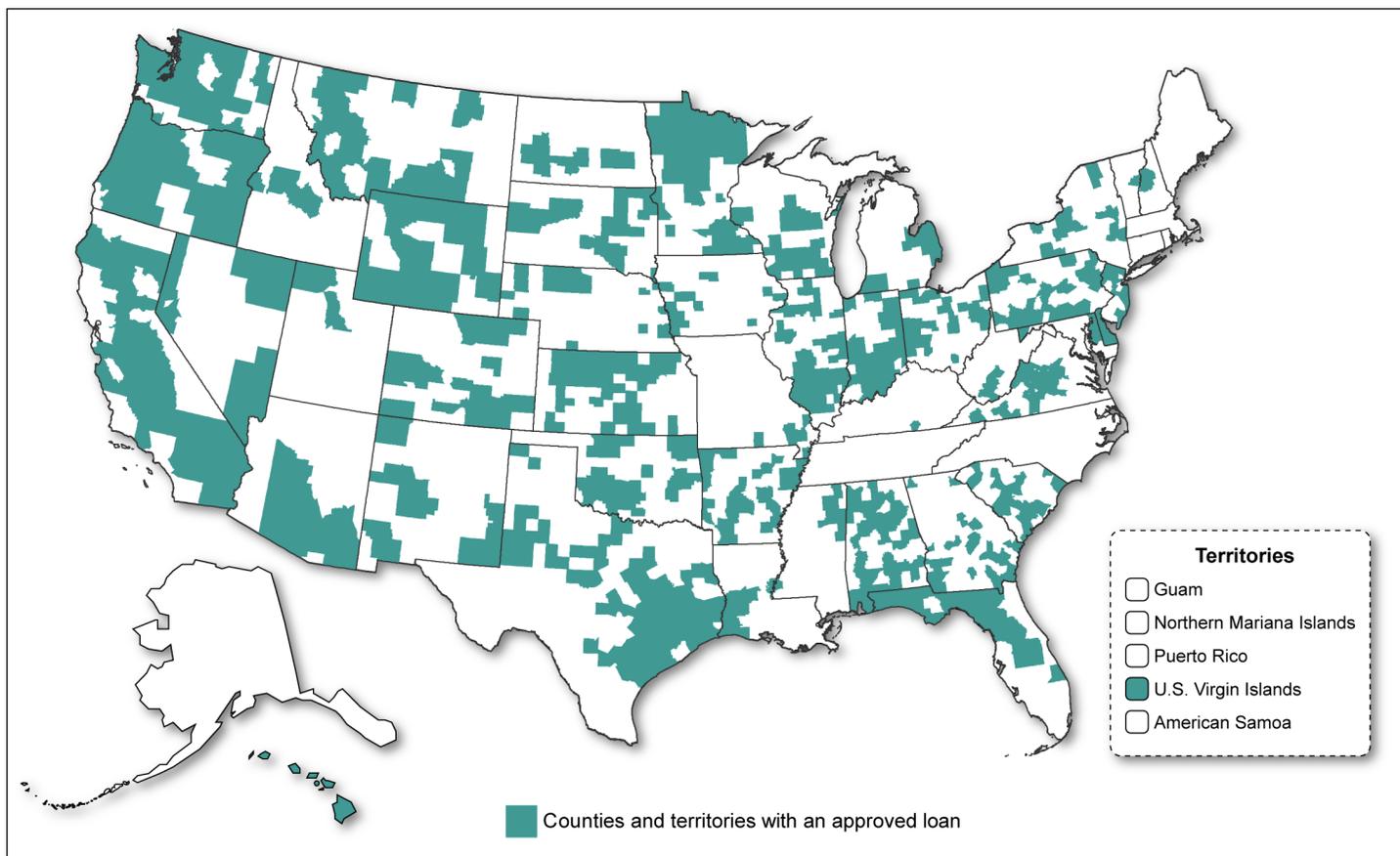
²²This is the total amount approved by RUS, not necessarily the actual amount paid out by RUS, since some loans are rescinded or reduced or defaulted before all funds were paid out.

²³This program was intended to finance broadband infrastructure projects, overlapping the agency's other broadband loan programs. For fiscal year 2010, RUS gave priority to the Recovery Act program.

²⁴One loan was also awarded to a U.S. territory, the U.S. Virgin Islands. Additionally, not all loans supported projects located in a single state; 20 loans were awarded to communities in multiple states.

regions of the country. As discussed further below, not all approved loans are still active. We did not observe significant geographic differences between loans with different repayment statuses.

Figure 1: U.S. Counties and Territories with One or More Approved RUS Broadband Loans, 2002—2013



Source: GAO analysis of Rural Utilities Service data.

Note: For the purposes of this graphic, if a county had one or more communities served by an RUS loan, the entire county is deemed served. The highlighted areas therefore do not represent the exact service areas of all projects supported by the RUS broadband loan program.

RUS broadband borrowers are located in regions with varying topography, including differing weather and terrain.²⁵ For example, we

²⁵We selected our site visits based on a variety of factors, including the size and status of the loan and geographic diversity. See appendix I for more information.

spoke to borrowers in dissimilar regions, including North Dakota (plains with some hills); New Mexico (high desert); and Vermont (rocky hills and mountains). Some aspects of these rural areas can result in challenges for broadband deployment, with some stakeholders stating that the unique characteristics of their region affected the amount of time and resources they needed to install broadband. Officials at a broadband provider we spoke with in New Mexico, for instance, said that the extremely hard, rocky ground in the service area results in very high per-mile costs for installing fiber infrastructure in the ground. Another provider in North Dakota told us that the long winters limit the time available for installing fiber to about 4 months a year.

Loans have been made to providers in areas with a variety of demographics and economies:

- On average, counties where RUS loans were approved have a higher poverty rate, 15.6 percent, than the national average, 14.9 percent. In these loan counties, the rate ranges from 4.2 percent to 41.1 percent, based on U.S. Census Bureau (Census) data.
- Overall, counties with approved RUS loans have a higher percentage of adults over age 65, 15.7 percent, than the national average, 13.2 percent. The range of this age group in loan counties is also large, from 4.1 to 44.5 percent.
- The per capita income of loan recipient communities is also diverse. For example, our site visit communities included Portales, New Mexico, with per capita income of \$15,881, and Dickinson, North Dakota, with per capita income of \$28,253.²⁶
- Some areas where we conducted interviews, such as Eagle Butte, South Dakota, were highly rural and remote. These areas had low population densities and also tended to be lower-income, overall.
- Other site visit locations, including the rural communities of Hudson and Catskill, New York, were located in relative proximity to large cities, and had some of the characteristics of more urban areas, such as robust “creative economies.” For example, Hudson, New York, is located within a 2 hour drive from both Albany and New York City, and has recently attracted a number of businesses such as art galleries.
- Two site visit communities, Dickinson, North Dakota, and Hobbs, New Mexico, have experienced recent surges in population and

²⁶All figures are in 2012 dollars.

infrastructure needs associated with the oil and natural gas industry, according to providers with whom we spoke.

Communities Served by RUS Broadband Borrowers Generally Meet Past and Present Definitions of Rural

The definition of what constitutes a “rural” community can be difficult when determining how to target rural communities for broadband assistance. A narrower definition may mean that deserving communities are excluded. A broader definition, though, may mean that communities not traditionally considered “rural” or “underserved” may be eligible for financial assistance, which could then limit funds available to the most rural areas. The USDA’s Office of Inspector General has reported that rural requirements are important to keep the focus of loans on rural areas that are unlikely to receive broadband service through the private market.²⁷

When analyzed in the aggregate, the majority of active RUS loans since the program’s inception satisfy RUS and other commonly accepted definitions of rural. The RUS definition of eligible rural areas for the loan program has been changed twice to better target loans to rural areas.²⁸ In 2008, for instance, the definition of an eligible community was changed to exclude communities adjacent to urbanized areas.²⁹ This change followed a 2005 finding by the USDA’s Office of Inspector General that some loans had been made to areas that were not truly rural, such as suburban communities bordering large cities.³⁰ We found that the majority of active RUS loans were made to providers in communities that satisfy the 2008

²⁷U.S. Department of Agriculture, Office of Inspector General, Southwest Region, *Audit Report: Rural Utilities Service Broadband Loan and Loan Guarantee Program*, 09601-8-Te (Washington, D.C.: Mar. 31, 2009).

²⁸The 2002 definition required that communities not exceed 20,000 inhabitants and not be within a metropolitan statistical area. Pub. L. No. 107-171, § 601, 116 Stat. 416. In 2004, the definition was loosened to allow some communities within MSAs. Consolidated Appropriations Act of 2004, Pub. L. No. 108-199, § 772, 118 Stat. 3, 40.

²⁹Food, Conservation, and Energy Act of 2008, P.L. No. 110-246, § 6110, 122 Stat. 1657, 1960. As we previously stated, eligible areas now include communities of 20,000 or fewer inhabitants that are not within urbanized areas next to a town of greater than 50,000 population. In order to be considered rural by RUS, all communities in the proposed service area of a loan must meet the definition.

³⁰U.S. Department of Agriculture, Office of Inspector General, Southwest Region, *Audit Report: Rural Utilities Service Broadband Grant and Loan Programs*, 09601-4-Te (Washington, D.C.: Sept. 30, 2005).

and 2004 definitions of rural used by RUS.³¹ Additionally, the majority of active loan communities meet alternative definitions of rural. Specifically, our analysis assessed whether loans could be considered rural using the standard Census definition as well as USDA's Rural-Urban Commuting Area Codes (RUCA). Census classifies a community as rural if it falls outside of an urban area, and most active loans adhered to this population density-based definition, whether 2000 or 2010 Census data were used.³² The USDA Economic Research Service's 2013 RUCA is a more in-depth set of data that incorporate Census tract commuting patterns and other measures of "rurality" in addition to population density.³³ The majority of the active loans fell into the "large rural town" and "small town/isolated rural" categories.³⁴

With only five loans approved since 2008, we were not able to assess whether the overall rurality of loans has changed as a result of the 2008 reauthorization act. Additionally, stakeholders generally did not object to the current definition of rural used by RUS. Some site-visit interviewees suggested that additional factors besides population, such as socioeconomic characteristics, be considered as part of the eligibility requirements.

³¹Specifically, 68 percent of active loans meet the 2008 and 79 percent, the 2004 definitions of rural, based on our analysis using 2010 Census data. Only about half, 47 percent, of active loans satisfy the most restrictive criteria—the 2002 definition—used by RUS for the loan program. We did not analyze whether specific loans approved by RUS were not eligible under the relevant definition of rural at the time.

³²Specifically, 93 percent of active loans fell outside of a 2010 Census urbanized area, and 95 percent, outside of a 2000 Census urbanized area.

³³RUCA has 10 tiers along the spectrum of rurality, each of which is further broken down into secondary codes. We used the 4-tiered data consolidation recommended for analysis by the Washington State Department of Health. See Washington State Department of Health, *Guidelines for Using Rural-Urban Classification Systems for Public Health Assessment*, revised February 2009.

³⁴Specifically, 60 percent of these loans fell into rural categories using the 2013 RUCA codes. We performed this analysis using both 2006 and 2013 RUCA data, and found the loan communities met rurality criteria more often when using the 2013 data, which are based on the 2010 Census.

Over 40 Percent of Approved Loans Are No Longer Active Because They Are in Default or Have Been Rescinded

Of the 100 RUS loans approved since 2002, 57 are active or have been repaid (see fig. 2). The other 43 loans are no longer active, either because they have been rescinded or are in default. These inactive loans represent 43 percent of the total number of loans awarded and 54 percent of the total loan dollars awarded to date.

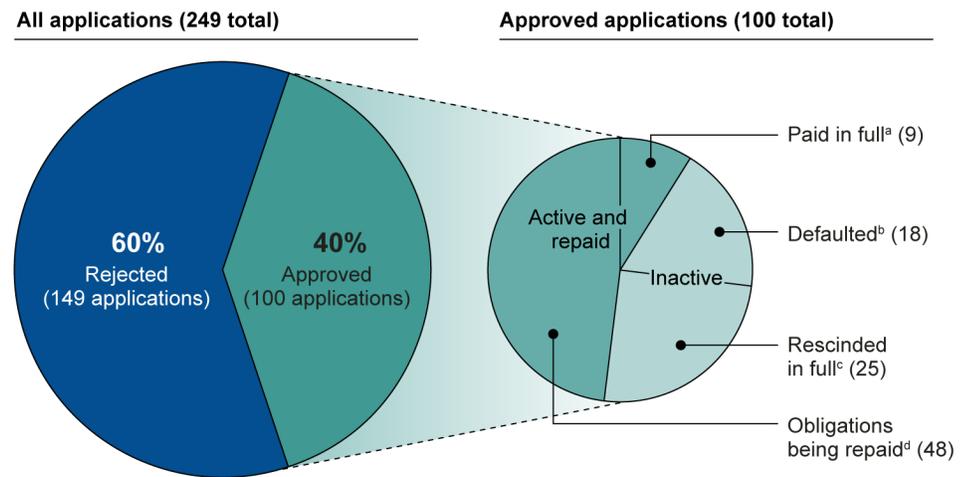
- The majority of RUS loans approved by RUS to date are *active* or have been repaid. These loans include 48 that are currently repaying outstanding obligations as scheduled, as well as 9 that have been fully paid back to the agency. Both of these categories include some loans that have been reduced, meaning the provider has elected to not accept the full loan amount or completed its project ahead of schedule and did not require the remaining funds.
- Twenty-five of the 100 loans approved to date have been *rescinded*, meaning that they were cancelled before any portion of the loan was paid out to the approved provider. RUS officials stated there are varying circumstances where a loan might be rescinded, including situations where the provider cannot meet equity requirements or the provider experiences significant financial problems before the principal has been loaned. Although providers sometimes voluntarily request a full rescission, that situation is less common.
- Eighteen loans approved to date are *in default*, a situation defined by RUS officials as when a borrower is unable to meet its payments over time and may require intervention by RUS and possibly the Department of Justice to recover the funds that have been distributed.³⁵ Officials said loans generally default because the provider cannot produce the necessary revenue to support the broadband network and debt payments, often due to not attracting enough subscribers. When a provider misses a payment, RUS takes interim steps before classifying the loan as in default.³⁶ A defaulted loan may result in the cancellation of any unpaid portion of the loan.
- Throughout the time period of the loan program, RUS has rejected 149—60 percent—of the 249 applications received because providers did not meet the financial requirements for loans or proposed service

³⁵We did not perform an in depth analysis of the characteristics of a loan more likely to default because this would require us to evaluate details of companies' finances, which was outside the scope of this study. However, of the 18 defaulted loans, the majority was for wireless projects, and many involved companies that have filed for bankruptcy. Overall, loans that defaulted did not involve significantly larger loan amounts than non-defaults.

³⁶Specifically, RUS begins by notifying the provider of a missed payment to provide it an opportunity to catch up on payment or develop a repayment plan.

areas did not meet the definition of rural, among other reasons, according to RUS officials. The primary reason for rejections is insufficient credit support to justify the project’s “business case.”

Figure 2: Status of Broadband Loan-Program Applications, 2002—2013



Source: GAO analysis of RUS data.

^aProviders for these projects have paid back the entirety of their loans to RUS. We classify these as active for the purposes of this report.

^bThese projects have been unable to make payments as scheduled and are officially classified as in default by RUS.

^cThese loans have been effectively cancelled without any portion ever being advanced to the provider.

^dThese loans are in the process of being repaid.

The USDA’s Office of Inspector General noted in its 2005 review of the loan program that out of 28 approved pilot program loans, 6 were in default. Further, the Office of Inspector General said, “[H]ad the progress of these projects been timely and thoroughly monitored, RUS might have been able to avoid advancing loan funds to companies that were failing. Because these loans were not carefully serviced, these funds are not available to support future broadband loans.”³⁷ Since the loan program

³⁷U.S. Department of Agriculture, Office of Inspector General, Southwest Region, *Audit Report: Rural Utilities Service Broadband Grant and Loan Programs*, 09601-4-Te (Washington, D.C.: Sept. 30, 2005). According to RUS officials, RUS disagreed with this finding at the time of the Office of Inspector General report and still disagrees.

was created in 2002, about 18 percent of all loans have defaulted.³⁸ In contrast, a private, but government-sponsored, lender that finances broadband projects we spoke with stated that only about 1 to 3 percent of its clients will fail to implement their projects. However, officials with that private lender noted that their investment strategy differs significantly from RUS, with RUS's program requirements allowing more risk in their loan portfolio. As RUS officials told us, private lenders can decline to award any loan, whereas RUS must implement the program in accordance with its authorizing statutes.

Loans that are approved by RUS require significant resources to review and monitor. According to RUS officials, these administrative costs are not just one-time expenses associated with the application review, but are incurred throughout the life of the loan.³⁹ For loans made to providers that experience financial challenges, RUS staff must conduct additional follow-up work, including work associated with any decisions to rescind a loan. Therefore, failure of many defaulted and fully rescinded projects to result in broadband service can represent an inefficient use of RUS resources. RUS acknowledged that dedicating resources to servicing loans in default takes away resources that could be used for evaluating new applications, but it did not agree that this is an inefficient use of resources. Additionally, the rescission of funding for projects in a year when RUS obligates the entirety of its total authorized value of loans that year could prevent more viable applicants from receiving loans.

Despite these issues, RUS has not gathered information or performed analysis to better understand what might lead a project to default or otherwise make a project a poor candidate for receiving the loan. According to RUS officials, a lack of staff resources has prevented them from studying the reasons for failed projects. Other USDA staff, though, such as researchers in the Economic Research Service who are responsible for informing and enhancing public and private decision making, may have the expertise to examine these issues. Additionally,

³⁸The total dollar value of these 18 defaulted loans is \$488.2 million, but this represents the total approved loan award. In some cases, RUS did not pay out all of the loan before default. Additionally, RUS may have recovered all of the funding it paid out for these defaulted loans.

³⁹Specifically, each approved loan requires, among other things, monitoring of construction, review of quarterly financial reports submitted by providers, and security arrangements.

RUS officials said the agency is undergoing a staff reorganization that will establish a branch to oversee loan performance.⁴⁰

Federal guidance emphasizes the importance of assessing the risk associated with loan programs. Office of Management and Budget (OMB) guidance states that agencies should annually “take steps to evaluate and analyze existing asset portfolios” to identify ways to improve credit management and recoveries.⁴¹ Also, as we have previously found, best practices for lenders emphasize an understanding of the risk posed by government loans, both on the level of individual loans and the overall portfolio.⁴² To address credit risk, best-practice lenders focus on controlling the quality of individual loans approved. These efforts include routinely reviewing loan performance. By not identifying the common characteristics of defaulted and fully rescinded loans, if any, RUS may continue to expend resources on loans that ultimately do not succeed in providing funds to broadband providers for new or improved services.

RUS Loans Can Help Promote Limited Broadband Deployment and Economic Development, but Performance Goals Do Not Fully Align with Program’s Purpose

⁴⁰Currently all program staff work both on awarding and servicing loans.

⁴¹OMB, *Policies for Federal Credit Programs and Non-Tax Receivables*, OMB Circular No. A-129, § IV.C.(c). (January 2013).

⁴²GAO, *Small Business Administration: New Service for Lender Oversight Reflects Some Best Practices, but Strategy for Use Lags Behind*, [GAO-04-610](#) (Washington, D.C.: Jun. 8, 2004).

RUS Loans Can Help Overcome Financial Barriers to Deploying Broadband in Rural Areas

Broadband projects in rural areas are generally more expensive, on a cost-per-subscriber basis, than projects in metropolitan areas, creating a financial barrier to deployment, according to our review of the relevant literature. While the numbers of new broadband subscribers continue to grow overall, studies and data suggest that the broadband deployment rate in metropolitan areas is outpacing the deployment rate in rural areas.⁴³ The comparatively lower population density and income of rural areas are primary reasons why broadband is less deployed there than in suburban and urban areas. As a result, developing a business case to build broadband infrastructure that guarantees a return on investment can be difficult for rural providers. Aside from RUS loans, there are few alternatives for financing rural broadband projects because banks typically do not make loans for projects that lack a strong business case.

According to several stakeholders we spoke with, RUS loans have helped providers overcome financial barriers to broadband deployment, allowing providers to upgrade existing service to faster technologies and expand deployment to new subscribers in rural areas. In these areas, RUS loans can be an essential source of financing. Officials we spoke with in four rural communities said that broadband services would likely not exist in very rural areas without federal support. For example, representatives of providers in Kansas and Vermont told us their RUS loan was essential to construction of broadband infrastructure in their rural service areas.

According to our analysis of affected areas, the RUS loan program has had a mixed record of increasing overall broadband deployment. In order to further assess the impact of loans on broadband deployment, we compared the number of broadband providers in counties that have RUS-financed broadband projects to the number of providers in counties that applied but were rejected for a RUS loan as well as counties that had fully rescinded loans, using the latest data from the NBM. Our goal with this analysis was to compare counties that were generally similar but for the presence of a RUS loan. Overall, counties with RUS-financed projects generally do not have more broadband providers than similar counties. Specifically, as of June 2013, counties with RUS projects had an average of 4.9 broadband providers, whereas counties with rejected and

⁴³For a summary of these issues and federal broadband programs, see Congressional Research Service. *Broadband Internet Access and the Digital Divide: Federal Assistance Programs*. (July 17, 2013).

rescinded projects had an average of 5.1 broadband providers.⁴⁴ While this analysis suggests that RUS loans have little to no overall impact on the number of broadband providers, the county-level data could mask local impacts of loans. Indeed, information we collected during our site visits indicate that RUS loans can lead to enhanced broadband deployment in specific rural areas within counties. For example, rural areas around East Corinth, Vermont, had no broadband access until the local provider was awarded a RUS loan. Catskill, New York, only had one broadband provider until a RUS loan enabled another provider to build into the community. A RUS loan also helped a provider upgrade service in rural areas around Eagle Butte, South Dakota, from dial-up access to digital subscriber line service. In a February 2014 report, we also found that providers have used federal programs to expand their existing networks by laying new fiber optic lines or using other technologies to make broadband available in areas that were previously unserved or underserved.⁴⁵

Some rural areas do not have enough potential subscribers to justify the upgrade or expansion of broadband services even with a RUS loan. One provider noted that even with a federal grant—which would not require repayment—extending service to some rural geographies or upgrading services to state-of-the-art technology could be prohibitively expensive over the long-term since the ongoing costs of providing service can be higher than the revenue generated by the rural subscribers.

RUS Loans Can Create Opportunities for Modest Economic Development and Enhance the Quality of Life in Rural Areas

⁴⁴This analysis specifically looked at wireline broadband providers offering advertised download speeds of at least 3 megabits per second. The analysis was conducted at the county level because some individual communities do not have complete data in the NBM. Counties contain multiple communities, each of which may have a unique broadband provider, in addition to larger providers that may be present throughout the county. This can lead to an overall large number of reported providers within the county.

⁴⁵GAO, *Telecommunications: Federal Broadband Deployment Programs and Small Business*, [GAO-14-203](#) (Washington, D.C.: Feb. 7, 2014).

Economic Development

Several stakeholders told us that broadband services financed with RUS loans help local businesses be more competitive, fostering economic development. Having the ability to communicate and conduct business online reduces the effect of physical distances that are otherwise a barrier. According to state officials in South Dakota, broadband access gives rural businesses the opportunity to participate in the wider national economy and potentially the global economy. They noted that with broadband, ranchers have access to a larger market because they can participate in online auctions and show cattle to potential buyers via streaming video. Rural development officials in Vermont also told us that broadband enables online financial transactions for rural residents to conduct both bookkeeping and shopping, provides a forum for community outreach, and facilitates increased tourism, among other things. According to one official we spoke with in Vermont, some tourists prefer to have broadband access while vacationing.

Businesses and entrepreneurs may choose to locate in a community in part based on access to broadband. According to two business site selection experts—consultants who specialize in helping businesses identify new business locations—we spoke with, reliable broadband networks are now critical for rural businesses. The lack of broadband connectivity in a rural area could significantly hinder the ability of that area to attract and retain businesses. These perspectives are consistent with broader academic research, which has found that access to reliable and affordable broadband is viewed as particularly important for the economic development of rural areas because it enables individuals and businesses to participate fully in the online economy regardless of geographical location.

Since a variety of factors can influence local economic development, we developed a model to assess the impact of the RUS loan program on economic development. We used a regression model since this technique can help control for a variety of extraneous factors, such as growth of the national economy in general. Specifically, our model compared employment, payroll, and business establishments of counties affected by RUS loans to similarly rural counties that were not affected by loans, using RUS and Census data from 2003 through 2011.⁴⁶

⁴⁶This type of statistical method only suggests correlations between variables and not causation.

According to our analysis of RUS loans and economic development data, counties affected by at least one approved RUS loan were associated with modestly higher levels of employment and payroll after the year of loan approval and in all subsequent years, as compared to counties that did not receive RUS loans.⁴⁷ We found that RUS loans are associated with a one to four percent higher level of employment and payroll in affected counties. As noted above, stakeholders told us that broadband access can help make businesses more efficient, which can lead to job creation and increased payroll. However, we found no relationship between RUS loans and the number of total business establishments in a community. We ran the model using several specifications, most of which involved alternative comparison groups of unaffected counties, and our results were consistent.

Several factors could contribute to the findings from our model. The lack of effect on the number of establishments, and the modest impact on employment and payroll, may be the result of the county being too coarse a level of analysis for evidence of impact to emerge, meaning the county's scale overwhelms in size the service area of broadband providers receiving loans. Additionally, the effect of the loan program may not be strong enough to affect the number of business establishments at the county level. While e-commerce is greatly facilitated by broadband access, it can hinder rural businesses by making it cheaper and easier for local residents to shop on-line rather than at local establishments. Nevertheless, our results are broadly consistent with information we gathered in site-visit interviews about how enhanced broadband access enabled by the RUS loan program can have a modest, positive impact on the local economy. As an official at the Chamber of Commerce in Columbia, New York, noted, lack of broadband access outside of major towns is hindering growth, and investment in broadband infrastructure would accelerate economic activity in Columbia County.

Quality of Life

Beyond economic development, broadband services financed with RUS loans can enhance the quality of life in rural communities. For example, broadband can bring educational opportunities to rural communities through online-learning technologies. Two South Dakota college officials we spoke with said broadband services have enabled their students to

⁴⁷Our geographic unit of analysis for this work was the county because counties—more fully than zip codes, though not completely—encompass the geographical extent of local labor markets. For more information on our methodology for this model, see appendix II.

access on-line journals through the local university. Video teleconferencing enables students at several schools to attend the classes of a single instructor. Earning course credits online can also be less expensive than taking classes in person, helping students save money and expanding access to education to lower-income students. Telemedicine and telehealth⁴⁸ have been hailed as vital to health care in rural communities, by expanding the medical services available. According to a provider we spoke with, RUS-financed broadband services in rural South Dakota have facilitated the remote use of some Veterans Affairs services. A provider in Kansas said hospitals in rural areas also rely on telemedicine technology to access information and personnel at larger medical institutions.

Broadband can also create opportunities to search for jobs and work from home. Access that allows individuals to work from home (“telework”) can enhance businesses and organizations’ continuity of operations, provide new job opportunities to retirees and the disabled, among others, and can benefit the environment. According to officials in the Catskills area of New York, weekend residents would spend more time in their second homes there if they could telework, which could bring greater revenues to local merchants and restaurants. Officials with a rural South Dakota broadband provider noted that more people are working from home, as evidenced by the amount of bandwidth being used. Broadband can also facilitate online job searching. South Dakota state officials also cited a state workforce-development program, Dakota Roots, which works to “re-stake” former South Dakota residents who would like to return to South Dakota by connecting them with employment opportunities posted at their website.

⁴⁸The terms telemedicine and telehealth are often used interchangeably and generally refer to technologies that allow rural patients to receive, through remote access, medical diagnoses or patient care, often from specialists who are located in urban areas or university hospitals. For more information, see GAO, *Telecommunications: FCC’s Performance Management Weaknesses Could Jeopardize Proposed Reforms of the Rural Health Care Program*, [GAO-11-27](#) (Washington, D.C.: Nov. 17, 2010).

USDA Annual Performance Goals and Measures Do Not Fully Align with the Loan Program's Purpose

USDA's *Annual Performance Report (APR)* provides information on the achievements of USDA's programs each fiscal year. The *APR* is produced in part to satisfy requirements in the GPRA Modernization Act of 2010⁴⁹ (that updated the Government Performance and Results Act of 1993⁵⁰) which along with OMB requirements⁵¹ aims to ensure agencies use performance information in decision making and hold them accountable for achieving results and improving government performance. As our past work has shown, an attribute of a successful performance measure is whether it aligns with division and agency-wide goals.⁵² We have also found that congressional staff wants a clear depiction at the program level of the linkages between program resources, strategies, and the objectives they aim to achieve.⁵³

The goals in USDA's *APR* do not fully align to the purpose of the RUS broadband loan program. The purposes of the loan program are to improve broadband deployment in rural areas—that is, increase the number of broadband subscribers with access to new or improved broadband service—and ultimately increase economic opportunity in rural America. USDA's fiscal year 2013 *APR* includes a strategic objective to “enhance rural prosperity,” under which is an annual performance goal related to broadband adoption and the broadband loan program: “number of borrowers/subscribers receiving new or improved telecommunications services.” This performance goal is assessed using data on the number of subscribers to be served for each loan, derived from applicants' estimates in their approved loan applications.⁵⁴ This method does not measure actual adoption of RUS-financed broadband services. As the

⁴⁹Pub. L. No. 111-352, 124 Stat. 3866 (2011).

⁵⁰Pub. L. No. 103-62, 107 Stat. 285 (1993).

⁵¹OMB, *Preparation, Submission, and Execution of the Budget*, Circular No. A-11 (2013).

⁵²GAO, *Tax Administration: IRS Needs to Further Refine Its Tax Filing Season Performance Measures*, [GAO-03-143](#) (Washington, D.C.: Nov. 22, 2002). In this report, we developed nine attributes of successful performance goals and measures based on key legislation and other factors. See the report for additional details.

⁵³GAO, *Managing For Results: Views on Ensuring the Usefulness of Agency Performance Information to Congress*, [GAO/GGD-00-35](#) (Washington, D.C.: Jan. 26, 2000).

⁵⁴USDA reports that “all applications undergo an extensive review to determine eligibility. Additionally, all approved applications must show feasibility from a financial and technical standpoint. Applicants also are required to perform market surveys of their proposed service areas. Therefore, the data are reliable.”

National Broadband Plan states, “adoption is necessary for utilization, but utilization is necessary to extract value from a [broadband] connection.”⁵⁵ Furthermore, USDA’s *APR* does not have any goals or measures to determine the loan program’s progress towards economic development outcomes.

As our past work has shown, agency performance goals that do not link to program goals can lead to incentives and behaviors that do not support the achievement of division or agency-wide goals.⁵⁶ As agencies develop annual performance goals as envisioned by the GPRA Modernization Act, they can serve as a bridge that links long-term goals to agencies’ daily operations. For example, an annual goal that is linked to a program and also to a long-term goal can be used both to hold agencies and program offices accountable for achieving those goals and to assess the reasonableness and appropriateness of those goals for the agency as a whole. Ensuring the linkage between the loan program’s purpose and the annual performance goals may be especially important since, as we discuss above, the RUS loan program has had mixed results with respect to improving broadband deployment and economic development. Performance goals that better evaluate progress toward the loan program’s goals may help USDA and Congress better monitor the outcomes of the loan program.

FCC Reforms of USF and ICC Have Created Temporary Uncertainty That May Be Hindering Investment in Broadband

⁵⁵FCC, *Connecting America: The National Broadband Plan* (Mar. 16, 2010), at p. 150.

⁵⁶[GAO-03-143](#).

About Half of RUS Broadband Borrowers with Active Loans Have Received USF Support, and Most Received ICC Support

About half of active RUS broadband borrowers have received USF support, which serves as an ongoing subsidy for telecommunications providers. Indeed, some investments by RUS borrowers have been made with the assumption on their part that at least some revenue to repay the loans would come from the USF. Fifty-one percent of RUS broadband borrowers with active loans—that is, loans that have not defaulted or been rescinded in full—received support from the USF High-Cost Program since 2003 (25 out of 49 borrowers; some of these borrowers received multiple loans). About 35 percent of all RUS broadband borrowers—that is, all providers with an approved loan regardless of loan status—have received USF support (30 out of 86 borrowers; some of these borrowers received multiple loans).⁵⁷ In addition to the RUS broadband borrowers that received direct USF support, 10 borrowers that do not receive direct support have a parent company that has received support.

The level of USF support for RUS broadband borrowers, overall, grew from 2003 to 2012. The average amount of USF support for all 30 RUS broadband borrowers that have received support was \$2,067,328, per year, from 2003 to 2013.⁵⁸ During this time period, the year with the highest average amount of USF support for all RUS broadband borrowers was 2012, while the lowest was 2003. The support for active RUS broadband borrowers specifically has ranged from \$8,162,834 in 2012 for Paul Bunyan Rural Telephone Cooperative in Minnesota, to \$39 in 2007 for SS Telecom, Inc. in South Dakota.⁵⁹

According to a RUS official, most broadband borrowers make and receive ICC payments—as part of the system of payments between providers for telecommunications traffic—since most borrowers offer both broadband and traditional telephone service. However, data on the total amount of ICC paid and received by individual providers are not available.

⁵⁷Throughout this section “USF support” refers to funding from the High-Cost Program. All 30 borrowers noted here received support from the High-Cost Program in at least one year since 2003.

⁵⁸The average amount of USF support for RUS borrowers with active loans, per year (2003-2013), was \$1,245,444.

⁵⁹Some USF recipients did not receive any support in some years and later received support.

Reforms May Change Amount of USF and ICC Support for RUS Broadband Borrowers

Reforms begun under the 2011 USF/ICC Transformation Order may change the amount of USF support for the majority of RUS broadband borrowers that receive support. In particular, with the Transformation Order, FCC took a number of actions:

- froze certain USF support for certain providers at 2011 levels;⁶⁰
- capped total per-line support as well as capital and operating expenses;⁶¹
- eliminated or began phasing down certain types of support;⁶² and
- created the Connect America Fund (CAF), which will ultimately replace the high-cost fund for certain providers.⁶³

However, many of the changes to the USF High-Cost Program that will affect RUS broadband borrowers have not yet been implemented. In the Transformation Order, FCC proposed changes to its methods for distributing funds to address some of the recognized program inefficiencies, but many of the details and mechanics of the transition from legacy high-cost support to the CAF have not yet been determined. In the meantime, RUS broadband borrowers—which are generally smaller providers operating solely in rural areas—will continue to receive support, with some modifications, from current support mechanisms pending full transition to the CAF or a similar mechanism tailored to small rural providers. Details of how future support will be determined are pending the completion of an extensive Further Notice of Proposed Rulemaking issued with the Transformation Order.⁶⁴

In the USF/ICC Transformation Order, FCC also reformed the ICC system. The current system involves payments—governed by various state and federal rules—between providers for telecommunications traffic. In the Transformation Order, FCC adopted a uniform national “bill-and-keep” framework as the ultimate end state for all telecommunications traffic exchanged with a local carrier.⁶⁵ According to FCC, under this

⁶⁰USF/ICC Transformation Order, ¶¶ 128-133. 26 FCC Rcd., 17712-17715.

⁶¹*Id.*, ¶¶ 158-168, at pp. 17725-17729.

⁶²*Id.*, ¶¶ 25-27, 507, 516-525, at pp. 17674, 17829, 17832-17834.

⁶³*Id.*, ¶ 20, at p. 17673.

⁶⁴*Id.*, part XVII, at p. 18045.

⁶⁵*Id.*, ¶ 35, at p. 17676.

approach, carriers look first to their subscribers to cover the costs of the network, then to explicit universal service support where necessary. Because this is a default methodology, carriers remain free to negotiate alternative arrangements that include carrier payments. As a result of the USF/ICC Transformation Order, all terminating access rates (generally governing charges for calls that begin and end in different local calling areas) and reciprocal compensation rates (generally for calls within the same area) were capped as of December 29, 2011. Over time (9 years for small, rural providers), certain terminating access rates and all reciprocal compensation rates will gradually be phased out. FCC has sought further comment on the proper transition and recovery mechanism for the remaining ICC rates.

Uncertain Levels of Future Support Hinder Broadband Investment, according to Stakeholders

With the elimination of some USF support and other changes implemented to date, a majority of RUS broadband borrowers have seen reductions in the amount of USF revenue they receive. Specifically, 18 of the 30 RUS borrowers directly receiving high-cost support in 2011 received less support in 2013 than in 2011. These 18 borrowers lost an average of 31 percent of their USF support over those 2 years, though not all of that loss can be directly attributed to USF reforms.⁶⁶

Some RUS broadband borrowers may have also seen net reductions in ICC support. According to an industry association we spoke with, small, rural providers like most RUS borrowers are generally net recipients of ICC, paying out less than they receive. The incremental decreases in ICC rates implemented to date may have therefore resulted in net revenue reductions for these small, rural providers.⁶⁷ FCC is implementing a “transitional recovery mechanism” to facilitate providers’ gradual transition away from ICC revenues reduced as part of the Transformation Order.⁶⁸ This mechanism allows providers to recover a portion of lost ICC revenues from increases in end-user (e.g., consumer) rates and, where appropriate, universal service support through ICC CAF.

⁶⁶These reductions in High Cost Program support could be the result of many factors, including USF reforms as well as decreases in the number of telephone subscribers, since support is tied to the number of lines being served.

⁶⁷FCC recognized in the USF/ICC Transformation Order that ICC reform “was not 100 percent revenue-neutral relative to” prior revenues. *Id.*, ¶ 848, at p. 17956.

⁶⁸*Id.*, ¶ 36, at p.17677.

Despite concerns, reductions in USF support have not limited the ability of broadband borrowers to pay back RUS loans, to date. According to RUS officials, the agency evaluates loan applicants' ability to pay back a loan based on their overall financial situation, including any support they expect to receive from the USF and ICC. RUS does not consider whether the parent company of the applicant receives such support. Some RUS loans were approved, and investments made by borrowers who assumed that at least some revenue to repay the loans would come from the USF. As the RUS Administrator noted in a 2012 letter to FCC, "changes to the federal USF and ICC can have a direct impact on the ability of existing RUS farm bill [broadband] borrowers to repay their outstanding loans and complete the construction of wireline broadband systems."⁶⁹ Additionally, according to RUS officials as well as a RUS broadband borrower we spoke with, reduced support for parent companies can have an indirect impact on borrowers, such as a decrease in the parent company's investment in the subsidiary. Nevertheless, FCC maintained in the Transformation Order that USF reforms "will in general not materially impact the ability of these carriers to service their existing debt." To date, no RUS broadband borrower that received USF support has defaulted on its loan. In contrast, as noted above, 18 other RUS loan program loans have defaulted.

Uncertainty regarding future support has led to some RUS broadband borrowers limiting broadband infrastructure investment. As noted above, some important details of the reforms to USF high-cost support have not been determined. Some broadband providers that we spoke with, including those that have and have not received a RUS loan, noted that they have postponed infrastructure investments pending these USF reforms. One provider in rural New Mexico we spoke with said that it is hesitant to build additional broadband infrastructure, especially high-cost fiber to the home, because it fears the consequences of USF reforms. Another provider in South Dakota maintained that it is not borrowing any more money for broadband build out because it does not know how much USF revenue to expect in the future. According to a study by a law firm of USF reforms, "since telecom services require high upfront capital investments that are recovered over a number of years, there will be

⁶⁹The Rural Telephone Finance Cooperative also noted in a letter to FCC that "reductions in USF support and/or net operating revenue without adequate transitions and a robust Connect America Fund could make it difficult for telcos to maintain key financial ratios and could lead to a greater likelihood of loan covenant breaches and payment defaults."

lesser and more sporadic investment in high-cost areas, due to the lower levels of support funding and increased uncertainty.”⁷⁰ According to officials we spoke with at CoBank, a government-sponsored bank that supports agriculture and the rural economy, the “bottom line” impact of USF reforms is that small, rural providers will likely have reduced access to debt capital, restricting their ability to upgrade or expand broadband networks. With broadband providers hesitant to invest in infrastructure projects, demand has decreased for the RUS loan program. For instance, RUS received 29 applications for loans in fiscal years 2011—2013, compared to 130 in the first 3 full years of the program.⁷¹ Nevertheless, FCC recently reported that since adoption of the Transformation Order the number of Census blocks with broadband service of at least 3 megabits per second download speed has increased.⁷² In addition, on April 23, 2014, the FCC issued a news release stating that it had adopted an order that will eliminate a rule that may have unintentionally encouraged providers to limit their investment in broadband-capable networks.⁷³

Much of the uncertainty regarding future USF support will be resolved with the full implementation of the USF/ICC Transformation Order, but the complexity of the reforms may result in a long implementation period. The rulemaking process being conducted to determine the mechanisms for future USF support requires FCC to provide the public with notice of its proposed and final rules, and with an opportunity to comment as the rules are developed. FCC officials told us that the rulemakings associated with the Transformation Order have been numerous and complex, and that the current Chairman has remained open to modifying proposed rules based on stakeholder feedback. As we have previously found, the complexity

⁷⁰Michael J. Balhoff and Bradley P. Williams, *State USF White Paper: New Rural Investment Challenges*, Balhoff & Williams, LLC (June 2013).

⁷¹Some of this decline in demand is also attributable to the existence of the Recovery Act broadband program, as well as the fact that new regulations for the broadband loan program took effect in March 2011 (Rural Broadband Access Loans and Loan Guarantees, 76 Fed. Reg. 13770 (March 14, 2011) (interim rule)), after which RUS required all pending applications be resubmitted. However, USDA reported in its fiscal year 2012 performance report that “the level of uncertainty caused by the new USF and ICC revisions directly impacted the level of demand for the infrastructure loan program.”

⁷²*Universal Service Implementation Progress Report*, WC Docket No. 10-90 (Mar. 18, 2014).

⁷³2014 WL 1653217 (April 23, 2014) (News Release), p. 4.

and number of rulemakings within a docket and the priority FCC places on a rulemaking contribute to the length of time dockets and rulemakings remaining open.⁷⁴ Moreover, elements of the USF/ICC Transformation Order have been appealed.⁷⁵

Conclusions

Broadband is now recognized as a necessity for economic and social life in America, and several public programs aim to encourage greater investment in rural areas. USDA's RUS is charged with administering one of these programs, which provides low-cost loans to rural communities, but the program has experienced mixed results. For instance, over 40 percent of approved loans are no longer active, with many having not resulted in new or improved broadband services. Considerable resources are invested by RUS to administer these loans and their failures therefore may represent an inefficient use of RUS resources. Studying the characteristics of rescinded and defaulted loans could enable USDA to better recognize loan applications that may not result in successful projects and therefore better target its limited resources.

Even RUS loans that do not default or are rescinded may not significantly increase broadband deployment or economic development in rural areas. Based on our analysis, we found that RUS loans help promote modest broadband deployment and economic development in affected rural areas. USDA evaluates progress toward these and other outcomes in its *APR*, though the performance goals it uses do not fully align with the purpose of the RUS broadband loan program. Given the modest impact of the loan program, aligning its performance goals with the program's purpose could help RUS better evaluate the loan program's performance and provide Congress with more information on the outcomes of the program so it can better hold USDA accountable for achieving results and improving government performance.

Recommendations

We recommend the Secretary of Agriculture take the following two actions:

⁷⁴GAO, *Telecommunications: FCC Should Take Steps to Ensure Equal Access to Rulemaking Information*, [GAO-07-1046](#) (Washington, D.C.: Sept. 6, 2007). The rules examined as part of this prior report's case studies took between 1.0 and 4.5 years to complete.

⁷⁵*In re: FCC 11-161*, Docket No. 11-9900 (10th Cir.).

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- evaluate loans made by RUS through the broadband loan program to identify characteristics of loans that may be at risk of rescission or default; and
 - align performance goals under the “enhance rural prosperity” strategic objective in the *APR* to the broadband loan program’s purpose, to the extent feasible.

Agency Comments and Our Evaluation

We provided a draft of this report to FCC for review and comment. FCC provided comments in a letter from the Chief, Wireline Competition Bureau. (See app. III.) In its letter, FCC neither agreed nor disagreed with the report’s findings. FCC provided comments on the presentation of certain facts related to USF programs. FCC said that although our report finds that uncertainty about the amount of high-cost support RUS borrowers would receive under FCC’s reformed universal service program has negatively affected investment in broadband, FCC recently adopted an Order eliminating a rule that may have unintentionally encouraged carriers to limit their investment in broadband networks. We added text to our report about this Order. Additionally, FCC noted the adoption of a mechanism to mitigate the impact of reduced ICC on providers. We moved our text discussing this mechanism from a footnote to the body of the report and also noted that FCC’s USF/ICC Transformation Order was never intended to be revenue-neutral for providers.

We also provided a draft of this report to USDA for review and comment. In an email received on May 9, 2014, a Management Analyst with USDA on behalf of the Assistant Administrator, Telecommunications Program, stated that RUS generally agreed with the facts presented in the report and will strive to fully implement our recommendations. However, RUS commented on the presentation of six facts in the report.

First, RUS said that it did not agree with our presentation of a map of areas served by RUS broadband loans (fig. 1). RUS’s comments indicated that the map may overstate the extent of loan service areas. However, the intent of this map is not to illustrate the extent of loan service areas but rather to illustrate the geographic distribution of RUS loans; the title and legend for the map clearly note that it reflects counties and territories with one or more approved RUS loans and we include a note explaining our methodology below the map. Thus, we continue to believe that its presentation is appropriate for the purpose intended.

Second, RUS noted that the areas around Catskill and Hudson, New York, which we describe as being relatively close to large metropolitan

areas, qualified for financing according to the statutory requirements of the program; RUS also said that because an area is close to an urban area does not mean it is an urban area. We did not assess whether the service areas of loan projects complied with statutory requirements, though based on our site visits, we agree that the areas around Catskill and Hudson are rural, and revised the report to clarify this point.

Third, RUS noted that it disagreed with the 2005 USDA Office of Inspector General finding about the pilot loan program that our report discusses; RUS said that it did monitor projects, and that the purpose of a pilot program is to try different approaches, which inherently involves taking on additional risk to determine the best approach. While we found the Office of Inspector General's findings sufficiently reliable for our purposes, we added text to our report indicating that RUS disagreed with the Inspector General's findings and continues to do so.

Fourth, RUS said that our comparison of the RUS loan default rate to a private lender may give the wrong impression, since RUS takes on more risk than a private lender and thus may have more defaults. We acknowledge that RUS takes on more risks than private lenders and may therefore have a higher default rate. However, even considering the additional requirements and risk inherent in the RUS loan program, its default rate is six times higher than the private lender with whom we spoke and we believe this warrants further examination by USDA. As we recommend above, we believe USDA should evaluate loans made by RUS through the broadband loan program to identify characteristics of loans that may be at risk of rescission or default.

Fifth, RUS agreed that dedicating resources to servicing loans in default takes away resources that could be used for evaluating new applications, but RUS does not consider this an inefficient use of resources as stated in our report; rather, RUS said that additional resources would allow it to be more effective in making funds available to rural areas for broadband service. We added text to the report further explaining RUS's view on this issue; however, we continue to believe, as we recommend, that a better understanding of the characteristics of loans that may be at risk of rescission or default would help RUS use its resources more effectively.

Finally, RUS noted two concerns with our analysis of the number of broadband providers in counties with and without RUS loans. First, RUS said it is unfair to compare the number of providers in a county in 2013 when loans to that county may have been approved as far back as 2003. Second, RUS said that our analysis misrepresents the impact of RUS loans on broadband deployment because it assumes the entire county is

served when only a small portion of a county may have actually received funds for broadband. One of the goals of the RUS loan program is to promote broadband service in communities where it would not otherwise exist. Accordingly, we assessed the extent to which the number of broadband providers in communities that received loans differed from communities that did not receive loans. The timing of the loan—whether it was made in 2003 or 2011, for instance—is not relevant to this analysis, since we were focused on the current state of broadband service. Comparing the current state of broadband service in areas that did and did not receive loans helps demonstrate the extent to which the loan program may be increasing the number of broadband providers. The fact that our analysis also uses counties, rather than individual communities, is also not a significant limitation because the data should show the presence of additional broadband service as a result of the loans even if the loans only affect portions of those counties. Therefore, we believe that this analysis is appropriate as one source of evidence about the impact of the RUS loan program on broadband deployment.

As we agreed with your office, unless you publicly announce the contents of this report earlier, we plan no further distribution of it until 30 days from the date of this letter. At that time, we will send copies of this report to the appropriate congressional committees, Chairman of the FCC, and Secretary of the Department of Agriculture. The report also is available at no charge on the GAO Web site at <http://www.gao.gov>.

If you or your staff have any questions regarding this report, please contact me at (202) 512-2834 or goldsteinm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.



Mark Goldstein
Director, Physical Infrastructure Issues

Appendix I: Scope and Methodology

To examine the geographic distribution and financial performance of loans, we gathered and analyzed Rural Utilities Service (RUS) loan data from 2003—2013. Specifically, we collected information on the recipient, approval date, amount, repayment status, as well as the proposed technology and communities to be served by the project for each loan approved by RUS as part of the Rural Broadband Access Loan and Loan Guarantee Program (“loan program”), including loans that have been rescinded. We also collected information on the proposed recipient, amount, communities to be served, and technology type for each rejected loan. Using this information, we assessed the distribution of active, rescinded, and rejected loans by state and region. We also analyzed the extent to which the loans met various definitions of rural, including those adopted by RUS for the loan program in 2002, 2004, and 2008, as well as the U.S. Census Bureau (Census) definition (areas not within urbanized areas) and the U.S. Department of Agriculture’s (USDA) Rural-Urban Commuting Area (RUCA) Census tract-based codes. We selected these definitions of “rural” based on discussions with stakeholders and studies of defining rural.¹ We determined whether loans met these definitions of rural by examining the extent to which the proposed communities to be served by the loan project together satisfied by the definition of rural.² Finally, we used the RUS information to summarize the repayment status of loans, including the number and type of active, defaulted, and rescinded loans.

To assess the relationship, if any, between RUS loans and broadband deployment in rural areas, we conducted statistical analysis using National Broadband Map data on broadband availability, comparing counties with approved RUS loan projects to counties with rejected and fully rescinded RUS loan projects. Specifically, we identified counties with approved RUS loan projects as well as those with rejected and fully

¹Specifically, Hart et al, “Rural Definitions for Health Policy and Research,” *American Journal of Public Health* (95), July 2005; and GAO, *Rural Housing: Changing the Definition of Rural Could Improve Eligibility Determinations*, [GAO-05-110](#) (Washington, D.C.: Dec. 3, 2004).

²Portions of the service area for some loan projects were not in communities but in unincorporated areas, about which we only had information about the county that area was in. With no way to map these areas, we excluded them from our review.

rescinded projects from the RUS loan information noted above.³ For counties that had both approved and rejected loan projects, we treated it as an approved loan county, since it has been “treated” by the RUS loan program through its approved loan. Rejected and rescinded loan project counties therefore included only those counties with rejected and/or fully rescinded loans. We identified the current number of broadband providers in those counties using National Broadband Map data downloaded from the website created and maintained by the National Telecommunications and Information Administration, in collaboration with the Federal Communications Commission (FCC). We used the most recent data available, which were current as of June 2013. In addition to the analysis comparing areas with approved, rejected, and fully rescinded loans, we also examined the broadband providers in select communities before and after the approval of a RUS loan. We selected these communities as part of our site visits, discussed below. We gathered the information on broadband providers present in these communities before the RUS loan from the relevant RUS loan files at USDA. We again used the National Broadband Map information to identify the providers present in these communities after the RUS loan approval. Few loans have been approved since 2008, so we determined that sufficient time had passed for most projects financed with RUS loans to have been substantially completed.

To assess the relationship, if any, between RUS loans and economic development in rural areas, we conducted statistical analysis of RUS and Census data. We developed a regression model using a panel dataset to assess the relationship between counties with approved loan projects and specific economic outcomes (number of business establishments,

³The service areas of RUS borrowers must meet RUS’s definition of rural, but can take any shape and must not necessarily conform to a political boundary (e.g., Census tract, zip code, county). As a result, “treated” areas (that is, areas part of an approved, fully rescinded, or rejected loan project) do not perfectly overlap areas for which economic outcome data are available (e.g., zip codes, counties). For our purposes throughout this report, we consider an area as “treated” (i.e., having received a loan) or “rejected” (i.e., having a fully rescinded loan or rejected loan application) if any part of it is included in the list of communities affected by the loan.

employment, and annual payroll).⁴ For more information on this model, see appendix II.

We assessed the reliability of RUS data by interviewing RUS officials about their databases and data collection practices. We also assessed the reliability of National Broadband Map data by reviewing its data collection procedures and methods, including how the map developers collect data and conduct quality assurance checks, as well as through interviews with stakeholders.⁵ We also assessed the reliability of Census data by reviewing its data collection procedures and methods. Based on this information we determined that the data provided to us were sufficiently reliable for our reporting purposes.

We also examined prior academic studies and government reports. As background, we reviewed relevant USDA Office of Inspector General reports. Additionally, to inform our quantitative analysis and provide additional information on the relationship between broadband and economic development, we examined prior academic studies of the RUS loan program as well as government and academic research on the general impact of broadband availability and adoption on communities. We identified these studies through a literature search of the ArticleFirst, Engineering Information Compendex, Inside Conferences, NTIS, PAIS International, PapersFirst, ProQuest, SciSearch, Social SciSearch, and WorldCat databases, as well as interviews with stakeholders. At least two GAO analysts reviewed the studies and reports we cite in this report for methodological adequacy.

For additional information on the relationships, if any, between RUS loans and broadband deployment and economic development, we conducted site visits to 16 communities in rural areas. These areas were selected to include providers who did and did not receive RUS loans as well as

⁴For our purposes throughout this report, we used county as the geographical region of quantitative analysis because economic development data are not available for some small individual communities. Additionally, counties more fully (although still incompletely) than zip codes or Census tracts encompass the geographical extent of local markets.

⁵National Broadband Map data has been found to misrepresent broadband availability in certain areas, either through providers overstating service areas or overall limited data for certain states. However, we could not identify a reason why these data limitations would systematically impact communities or counties associated with RUS loans so we determined our results would likely not be biased.

stakeholders in surrounding communities and state capitals. We also identified communities and RUS broadband loans with varying experiences and perspectives. The specific criteria used to identify site-visit locations included the status of the loan (if relevant), the size of the loan, location, technology of loan project (if relevant), and date of loan approval (if relevant). Based on these criteria, we conducted physical visits to North and South Dakota as well as New York and Vermont. These site visits included loan service areas (consisting of one or more communities) in a variety of regions, with active, rescinded, and rejected loans. They also included four loan service areas with loans above the median loan size and five loan service areas below median loan size (\$8,249,250). They also included a loan service area with one of the four loans approved after 2008, as well as loan projects utilizing three different technology types. Although using these criteria allowed us, in our view, to obtain information from a diverse mix of RUS broadband borrowers, the findings from our site visits cannot be generalized to all borrowers because they were selected as part of a nonprobability sample.

As part of our site visits, we interviewed, when possible, local broadband providers, including any that have applied for and received RUS loans. We also interviewed staff and members of local Chambers of Commerce, state and local government officials involved in broadband policy, and staff at state and local advocacy and economic development organizations. For additional information, we also interviewed broadband providers in Kansas, Louisiana, and New Mexico separate from our in-person site visits. In total, we spoke with broadband providers that have been approved for 10 of the 100 loans to date.

To determine the impact of reforms to the Universal Service Fund (USF) High-Cost program and Intercarrier Compensation (ICC) on the RUS broadband loan program, we reviewed FCC's 2011 USF/ICC Transformation Order that proposed changes to the USF and ICC mechanisms for determining support.⁶ We also reviewed stakeholder submissions to the rulemakings proposed as part of this Transformation Order, as well as studies and reports that assess the impact of the reforms. To calculate the extent of USF support for RUS broadband borrowers, we examined data—for the years 2003 through 2013—reported in FCC's Universal Service Monitoring Report. We assessed the

⁶*In the Matter of Connect America Fund*, 26 FCC Rcd. 17663, 27 FCC Rcd. 4040 (2011).

reliability of this data by reviewing relevant data collection and verification documents. Based on this information, we determined that the data provided to us were sufficiently reliable for our reporting purposes.

To better understand the impact of these reforms on RUS broadband borrowers, we also conducted interviews with officials from RUS, FCC, CoBank, and NTCA–The Rural Broadband Association. We also discussed these reforms with broadband providers that have and have not received USF support, as described above.

We conducted this performance audit from June 2013 to May 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Economic Development Model Methodology and Results

This appendix discusses the methodology used to develop a model analyzing the relationship between the RUS broadband loan program and economic activity in rural areas. In this appendix, we provide information on the scope, data, model, and results of our analysis.

Scope and Data

The time frame for our analysis was 2003 through 2011 because those are the years for which RUS and relevant Census data are available. The RUS broadband loan program was authorized in 2002 to finance the construction of broadband infrastructure in rural areas, following an earlier pilot program.¹ The first loans, though, were approved in 2003, so the relevant information associated with RUS loans begins in 2003. Broadband infrastructure projects funded by the RUS broadband loan program vary in geographic size. Projects must be designed to serve rural communities, although the geographic footprints of the proposed rural broadband projects do not consistently correspond to geographic units for which relevant data are collected. Some projects span more than one county, while others are focused on a specific area within a single county. We chose to focus our analysis at the county level, because counties, more fully (although still incompletely) than zip codes or Census tracts, encompass the geographical extent of local markets. Though the most recent loan was approved in 2013, the relevant annual county-level Census data on economic activity are only available through 2011.

To conduct our analysis, we acquired data from RUS on all applications for RUS loans. Some of these applications were approved while others were rejected by RUS. The data we received from RUS included the list of communities (i.e., cities, towns, and Census Designated Places) to be served by each loan project. For those projects that were approved, we also received data on the approval date and the loan's current repayment status. By matching the list of communities to Census data, we identified the counties associated with each project. This information allowed us to categorize each county as part of the service area of an approved project, a rejected project, a project for which loan funds had been rescinded by RUS, or not part of any project service area. Some counties included the service areas of more than one approved project; others included the service areas of, for instance, both approved and rejected projects. For

¹Throughout this appendix and report we refer to only loans made through the RUS Rural Broadband Access Loan and Loan Guarantee Program.

the purposes of this analysis, we classified every county associated with an approved project that has not been rescinded as being in *active* status, regardless of whether that county included the service area of a rescinded or rejected project. Counties associated with loans that have been rescinded were classified as being in *rescinded* status. Counties associated with rejected loans were classified as *rejected*.

We also acquired data from the Census. Specifically, we used County Business Pattern data on county employment, annual payroll, and number of business establishments from 2003 through 2011. Economic development has no universal definition or measure, but can be assessed using a variety of proxy measures. We identified our three measures of economic activity because they have been used in the past to assess the effect of a federal program on economic development. Specifically, in a 2006 report assessing the impact of Empowerment Zones on economic development, we used Census data on unemployment rates and the number of business establishments.² Additionally, in their analysis of the RUS loan program, Kandilov and Renkow used Census data on the number of business establishments, employment, and annual payroll as measures of economic development.³ Further, other studies have examined the impact of broadband availability and adoption on economic outcomes, using variables such as unemployment, household income, and number of firms or establishments.⁴

Because the RUS program targets communities in rural areas, we wanted to restrict our analysis to rural counties and to examine whether our results were sensitive to the characterization of rural used to select counties. We used two county-level data sources to define rural areas at

²GAO, *Empowerment Zone and Enterprise Community Program: Improvements Occurred in Communities, but the Effect of the Program Is Unclear*, [GAO-06-727](#) (Washington, D.C.: Sept. 22, 2006).

³Ivan T. Kandilov and Mitch Renkow, *Infrastructure Investment and Rural Economic Development: An Evaluation of USDA's Broadband Loan Program*, Growth and Change: Vol. 41 (2010).

⁴See Jayakar, Krishna and Eun-A Park, *Broadband and Unemployment: Analysis of Cross-sectional Data for U.S. Counties*, paper presented at the Telecommunications Policy Research Conference, 2013. Whitacre, et al., *Broadband's Contribution to Economic Health in Rural Areas: A Causal Analysis and an Assessment of the 'Connected Nation' Program*, paper presented at the Telecommunications Policy Research Conference, 2013.

the county level. We used Census information on county rural and urban population characteristics as of 2010. As an alternative, we also used USDA data that placed each county into one of nine categories on a rural–urban continuum.

Additionally, as part of the proximity-scoring process, to be discussed in more detail below, we used additional County Business Patterns data for an earlier time period and 2000 Census information on demographic characteristics of counties. Finally, we used the Gross Domestic Product price index to express payroll dollars in terms of calendar year 2013 values.

Model

Structure

Many factors affect changes in economic activity. In any particular place, economic activity can be influenced by natural resources in that area and the current fortunes of whatever industries have located there historically, among other factors. In any particular time, regional or national economies may be growing rapidly or may be in recession. In addition, the degree to which any area is connected to the broader economy has implications for economic performance. In this regard, the quality of access to transportation networks has long been identified as among the important factors explaining economic development. More recently, access to broadband infrastructure has been thought of in this context, and particularly in the case of rural communities, real and perceived lack of broadband access has been thought to hinder economic development and has provided the motivation for the RUS broadband loan program, among others.

Given that broadband infrastructure is one of many factors that could be associated with economic activity, it may be difficult in a modeling context to assemble all of the factors that may be necessary to distinguish one county from another in terms of its resources, industrial structure, and labor force characteristics, among other things. One estimation technique that can be useful in this kind of situation is to take advantage of the panel characteristics of this data. A panel data set is one in which there are observations for a given set of cross-section units, in this case county-level measures of economic activity, over several time periods, in this case years. A fixed-effects model of panel data can have two sets of dummy variables, one for each cross-section unit and one set for each time period. In our model, the former account for those observed and

unobserved effects that are constant over time but affect economic activity in a particular county, and the latter for effects that are constant across counties but vary over time, such as the condition of the national economy. The variable in which we are interested is defined as a zero (0) or one (1) RUS broadband loan indicator that varies over time and counties. Although the value of the loan indicator never takes a value of 1 in those counties without an approved project, the timing of approvals in those counties with approved projects varies over the time period.

Our model can be thought of as a treatment model in which some counties receive a treatment (the RUS broadband loan). Our goal was to estimate whether there is an association between this treatment and measures of economic activity, such as employment, payroll, or the number of establishments. In a treatment evaluation, however, it is important to have an appropriate comparison or control group of untreated subjects, in this case, counties that were not in the service area of a RUS broadband loan. The estimate of the treatment could be in part a reflection of the particular characteristics of those that pursued treatment, in this case those counties that were in the service areas approved for a RUS broadband loan. If those counties were growing faster, or were richer, among other possibilities, then those counties might be expected to continue to grow quickly over the analysis period. If these counties are compared to an average county, it might appear that the broadband loan is associated with the observed pattern of increased economic activity. Alternatively, if the treated counties are compared to other counties that are more similar, the estimated association with the broadband loan might be more modest or nonexistent.

Control Groups

A focus of our estimation approach was to develop a number of different control groups of rural counties without approved broadband loans. We identified three broad types of control groups. First, some control groups are defined using characteristics of the RUS program itself, such as those counties that were in the service areas of projects that were rejected by RUS. These were projects that, we assume, their developers believed would be successful. In this way, the counties in their service areas can be thought of as similar to the set of approved counties in unobservable ways. Second, control groups were defined on the basis of similarity to key observable characteristics of the set of approved counties. We use a proximity-scoring algorithm to match approved counties to other counties based on particular concepts of similarity. For example, to develop one control group, we looked for counties that were similar to approved counties in terms of economic growth in the period leading up to 2003,

the beginning of our analysis period. Third, we defined one control group on the basis of geographic adjacency to the set of counties in approved service areas. This control group may capture less readily observable characteristics of local economic activity in and around the service areas of approved loans.

Rural Definition

Within this estimation framework, a primary issue we considered was which counties to include in our analysis. Although we determined that counties were the best unit of analysis, in some cases they can still be too coarse a level of analysis for any evidence of the RUS loan program's impact to emerge. Accordingly, we used Census data on the rural and urban population characteristics of counties, as well as observations from our site visits (described above in app. I) to identify a suitable universe of counties. One consideration was that the dependent variables of interest in our model (i.e., the economic outcomes) likely scale with county population; that is, the level of employment and payroll, and the number of business establishments will likely increase with a county's population. In some counties that have large rural populations in an absolute sense but also include significant urban centers, the economic activity of the urban areas can overwhelm the activity in the rural portions of the county; these counties may not be well suited for inclusion in a county-level analysis. Our solution to this issue was to restrict the set of analyzed counties to those meeting a rural threshold, so that any changes in economic activity associated with broadband infrastructure had a better chance of being captured with county-level data.

We considered three definitions, and present some program implications of these alternative definitions in table 2. The initial threshold we chose was 90 percent of county population considered rural according to the Census, excluding all counties that are less rural.⁵ However, table 2 shows that this threshold had the effect of excluding many counties, including the vast majority of counties with an approved loan. Specifically, there are 289 counties in our data set with an approved loan, but only 52

⁵The Census Bureau's urban-rural classification is a delineation of geographical areas, identifying both individual urban areas and the rural areas of the nation. Census's urban areas represent densely developed territory, and encompass residential, commercial, and other non-residential urban land uses. Urban areas are delineated after each decennial census by applying specified criteria to decennial census and other data. Census identifies two types of urban areas: Urbanized Areas of 50,000 or more people; and Urban Clusters of at least 2,500 and less than 50,000 people.

of them were rural counties defined in this way. Using only a county's rural population has the consequence of treating many counties located in what would typically be thought of as rural areas as not rural because they contain small cities. Based on our site visits we determined that while counties with large Urbanized Area populations were generally too urban to be included in the model, counties with just the smaller Urban Clusters were appropriate. Our preferred threshold for counties was 90 percent of county population considered rural, defined as the sum of rural population and urban cluster population as determined by Census. Table 2 shows that this definition captures almost 90 percent of counties with approved loans.

As an alternative to constructing our own categorization using Census data, we also used the rural–urban continuum codes developed by USDA's Economic Research Service to select rural counties. Specifically, as an alternative, we considered a county to be rural according to these codes if the county was not in a metropolitan area and the urban population of a county was less than 20,000 people. This definition provided a selection of rural counties that fit somewhere between our other two in terms of number of included counties and approximately the same share of counties with approvals as the rural and urban combination definition. We present results for the two Census-based definitions. Results using the USDA definitions were more similar to the rural and urban cluster combination.

Table 2: Number of Counties with Rural Utilities Service (RUS) Loans Using Different Definitions of Rural

Set of Counties	Number of counties	Counties with active RUS loans	Counties with rejected RUS loans	Counties with rescinded RUS loans
All	3,038	289	862	593
90 percent Rural (Census)	671	52	160	41
90 percent Rural plus Urban Cluster (Census)	2,218	253	606	366
Economic Research Service codes	1,576	179	439	231

Source: GAO analysis of RUS loan data and U.S. Census Bureau information.

Note: This analysis reflects counties associated with loans made through the RUS Rural Broadband Access Loan and Loan Guarantee Program. Using RUS data on the proposed service areas of all RUS loan applications through 2011, we categorized each county as part of the service area of an active project, a rejected project, a project for which loan funds had been rescinded by RUS, or not part of any project service area.

Development of Control Groups

Rejected and Rescinded Loans

We developed three types of control groups. First, we developed groups from the program itself, including groups of rejected loan counties and rescinded loan counties. Rejected counties can be thought of as similar to approved counties in terms of intent by broadband providers to build rural broadband infrastructure. Rescinded counties can also be thought of in these terms, but these counties were in service areas that were actually approved for broadband loans.

Matching Counties

Second, we developed control groups based on observable characteristics of counties rather than attributes of the RUS loan program. Specifically, for each approved county we sought to find a non-approved county that is similar. Since there are many dimensions along which counties may be similar to one another, the use of proximity scoring is one way to identify control counties based on how similar they are to approved counties based upon a scoring procedure. In our case, we use logistic regressions on county-level factors that we think could explain whether a county had an approved loan. The proximity score for each county is derived from the logistic regression and reflects the probability that a county has an approved loan based on the set of explanatory variables. We develop two different sets of explanatory variables that we use to calculate proximity scores. The explanatory values are used as independent variables in the proximity scoring logistic regression in which the dependent variable is loan approval. Using the estimated coefficients and the values of the explanatory variables, a proximity score is calculated for each county. We then used a matching algorithm developed by researchers at the Mayo Clinic to select from among the non-approved counties a match for each approved county based on the proximity scores.⁶

⁶Specifically, we used the Statistical Analysis System macro 'gmatch', developed by Eric Bergstralh and Jon Kosanke of the Biomedical Statistics and Informatics Division of the Mayo Clinic, available via <http://www.mayo.edu/research/departments-divisions/department-health-sciences-research/division-biomedical-statistics-informatics/software/locally-written-sas-macros>.

We developed different control groups based on two sets of explanatory variables. The first set consisted of annual growth rates in county-level measures of economic activity over the pre-analysis period of 1994—2002. Specifically, for each county we estimated the annual growth rates in employment, payroll, payroll per employee, and the number of establishments, using County Business Patterns data. We interpreted the matches based on this scoring process to represent a control group that is similar to the set of approved counties based on economic growth profiles in the time period leading up to the start of the broadband loan program in 2003. The second set of explanatory variables consisted of demographic variables from the 2000 Census, again from a time preceding the broadband loan program. Specifically, for each county we examined data on county population, population density, per capita income, the share of county population aged 60 and above, the share of county population that has less than a high school education, and the share of county population that has a college degree or more. We interpreted the matches based on this scoring process to represent a control group that is similar to the set of approved counties based on demographic characteristics that may be related to the costs of providing broadband (population density) as well as characteristics related to the demand for broadband (income, age, and education profiles). Additionally, we developed a control group based on proximity scores using both of these sets of variables in the same scoring regression.

Adjacent Counties

Third, another alternative control group was comprised of the set of rural counties without approved loans that are geographically adjacent to the set of rural counties with approved loans. This set of counties was identified by using the Census county adjacency file for 2010. These adjacent counties are rural, not in the set of approved counties, and adjacent to at least one approved county. These counties included a mix of counties with and without applications.

Results

As discussed above, we used a simple fixed-effects model to estimate the relationship between RUS broadband loans and various annual measures of economic activity at the county level. Since our data consists of 9 annual observations for multiple counties, we have a panel dataset. Our dependent variables are county time series on employment, payroll, and the number of establishments, in log form. We regressed the dependent variables on year and county fixed effects and an indicator variable of whether a county had an approved broadband loan. The loan indicator

variable equals 0, except for counties with an approved broadband loan, when, beginning one year after the loan award an all subsequent years, it equals 1.

Our analysis using this model and our preferred definition of rural suggests that RUS broadband loans are associated with a 1 to 4 percent higher level of employment and payroll in affected counties in the year following the loan approval and all subsequent years (see table 3). The estimated effects on payroll were at the higher end of this range. We found no consistent relationship between RUS loans and the number of new business establishments in a community. Our results were much weaker when we restricted the model only to counties that were considered rural using the 90 percent rural population threshold (see table 4), but results were roughly comparable between the samples defined using rural and urban clusters definition and the Economic Research Service continuum codes. Generally speaking, for a given definition of rural counties, our results were consistent across the range of control groups we developed.

As noted above, these model results are broadly consistent with what stakeholders told us, including that broadband access enabled by the RUS loan program can help make businesses more efficient, which can lead to job creation and increased payroll. The lack of effect on the number of establishments, and the modest impact on employment and payroll, may be the result of the county being too coarse a level of analysis for evidence of impact to emerge. Additionally, the effect of the loan program may not be strong enough to affect the number of business establishments at the county level. For instance, while e-commerce is greatly facilitated by broadband access, it could hinder rural businesses by making it cheaper and easier for local residents to shop on-line rather than at local establishments.

Table 3 presents results using the rural and urban cluster definition of rural counties and provides results for the full range of control groups, and table 4 presents results using the rural definition. All of the dependent variables were expressed in log form and the parameter estimate on the loan variable can be interpreted as the percentage increase in the level of economic activity when the loan is in effect.

Table 3: Model Results for Counties 90 Percent Rural with Urban Clusters

Control group	Dependent variables (measured in logs)		
	Employment	Payroll	Number of business establishments
<i>Counties with rejected loans</i>			
Parameter estimate	0.016	0.038	0.001
[p-value]	[.052]	[.001]	[.865]
Number of observations	7,731	7,731	7,731
<i>Counties with fully rescinded loans</i>			
Parameter estimate	0.019	0.037	-0.004
[p-value]	[.014]	[.001]	[.365]
Number of observations	5,571	5,571	5,571
<i>Counties matched based on county growth factors</i>			
Parameter estimate	0.017	0.034	0.005
[p-value]	[.032]	[.001]	[.248]
Number of observations	4,536	4,536	4,536
<i>Counties matched based on county demographic factors</i>			
Parameter estimate	0.015	0.032	0.001
[p-value]	[.074]	[.007]	[.891]
Number of observations	4,554	4,554	4,554
<i>Counties matched based on county growth and demographic factors</i>			
Parameter estimate	0.019	0.030	0.007
[p-value]	[.018]	[.007]	[.116]
Number of observations	4,554	4,554	4,554
<i>Counties adjacent to counties with approved loan</i>			
Parameter estimate	0.017	0.029	0.007
[p-value]	[.031]	[.007]	[.080]
Number of observations	6,084	6,084	6,084

Source: GAO analysis based on RUS and Census data.

Notes: This table does not include parameter estimates for the county and year fixed effects. Since the dependent variables are in log form, the parameter estimates represent percentage changes. Additionally, p-values are calculated using robust standard errors that control for heteroskedasticity and within county serial correlation.

Table 4: Model Results for Counties 90 Percent Rural

Control group	Dependent variables (measured in logs)		
	Employment	Payroll	Number of business establishments
<i>Counties with rejected loans</i>			
Parameter estimate	0.019	0.043	-0.004
[p-value]	[.294]	[.054]	[.694]
Number of observations	1,908	1,908	1,908
<i>Counties with fully rescinded loans</i>			
Parameter estimate	-0.013	-0.011	-0.025
[p-value]	[.566]	[.723]	[.057]
Number of observations	837	837	837
<i>Counties matched based on county growth factors</i>			
Parameter estimate	0.012	0.016	-0.004
[p-value]	[.536]	[.486]	[.740]
Number of observations	918	918	918
<i>Counties matched based on county demographic factors</i>			
Parameter estimate	0.037	0.042	-0.003
[p-value]	[.065]	[.163]	[.757]
Number of observations	936	936	936
<i>Counties matched based on county growth and demographic factors</i>			
Parameter estimate	0.010	-0.008	0.006
[p-value]	[.554]	[.720]	[.591]
Number of observations	918	918	918
<i>Counties adjacent to counties with approved loan</i>			
Parameter estimate	0.021	0.014	0.008
[p-value]	[.199]	[.526]	[.435]
Number of observations	954	954	954

Source: GAO analysis based on RUS and Census data.

Notes: This table does not include parameter estimates for the county and year fixed effects. Since the dependent variables are in log form, the parameter estimates represent percentage changes. Additionally, p-values are calculated using robust standard errors that control for heteroskedasticity and within county serial correlation.

Though our findings were consistent across various model specifications, our findings require caveats. First, there are no standard metrics for measuring the economic impact broadband access and adoption can

have on a community, so our choices in data points may not accurately capture the true value of broadband to rural communities. Second, since RUS broadband loan-project service areas do not conform to county boundaries, our decision to treat all counties containing affected communities as “treated” may mask some very local affects of the broadband loans, or may overstate the extent of some effect. Additionally, regression analysis ascertains relationships, not causality, and models by definition contain a range of uncertainty.

Appendix III: Comments from the Federal Communications Commission



Federal Communications Commission
Washington, D.C. 20554

May 9, 2014

Mr. Michael Clements
Assistant Director
Government Accountability Office
441 G Street NW
Washington, DC 20548

Dear Mr. Clements:

Thank you for the opportunity to review and comment on the U.S. Government Accountability Office's (GAO) draft report entitled, "USDA Should Evaluate the Performance of the Rural Broadband Loan Program" (Draft Report). Our comments are limited to the portions of the Report that discuss the Federal Communications Commission's universal service fund (USF) programs.

The GAO Draft Report states that there has been some uncertainty among Rural Utilities Service (RUS) borrowers regarding the amount of high-cost support they would receive under the Commission's reformed universal service program adopted in the *USF/ICC Transformation Order*, and that this has negatively affected carrier investment.¹ We note that a Wireline Competition Bureau Report recently found, as GAO acknowledges,² that the number of census blocks in which rate-of-return carriers are providing broadband services of at least 3 Mbps/768 kbps has increased since adoption of the *USF/ICC Transformation Order*. The Commission recognizes that even though most study areas were uncapped by the quantile regression analysis, some parties have claimed that the Commission's benchmarking methodology discouraged investment in voice and broadband-capable infrastructure. In an Order adopted on April 23, 2014, the Commission eliminated its benchmarking rule because it may have unintentionally encouraged carriers that were not subject to the benchmarks to limit their investment in broadband-capable networks. The Commission's decision left in place the high-cost loop support mechanism that rural carriers have claimed is predictable.

¹ Draft Report at 27; see *Connect America Fund; A National Broadband Plan for Our Future; Establishing Just and Reasonable Rates for Local Exchange Carriers; High-Cost Universal Service Support; Developing a Unified Inter-carrier Compensation Regime; Federal-State Joint Board on Universal Service; Lifeline and Link-Up; Universal Service Reform – Mobility Fund*; WC Docket Nos. 10-90, 07-135, 05-337, 03-109, CC Docket Nos. 01-92, 96-45, GN Docket No. 09-51, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663 (2011) (*USF/ICC Transformation Order*), *pets. for review pending sub nom. In re: FCC 11-161*, No. 11-9900 (10th Cir. argued Nov. 19, 2013).

² Draft Report at 28.

The Draft Report states that the Commission's intercarrier compensation (ICC) reforms may have resulted in net revenue reductions for some rate-of-return carriers.³ Although the Commission capped the vast majority of interstate and intrastate switched access rates as of December 29, 2011, the Commission also adopted a mechanism, known as Eligible Recovery, to mitigate the impact of reduced intercarrier revenues on incumbent carriers.⁴ An incumbent carrier's Eligible Recovery is based on a percentage of the reduction in revenue each year resulting from the ICC reform transition. The Commission explained that it adopted this recovery mechanism in large part to provide predictability to incumbent carriers that had been receiving implicit ICC subsidies and to mitigate marketplace disruption.⁵ Incumbent LECs can seek Eligible Recovery through designated charges and, if necessary, from Connect America Fund support set aside for this purpose.⁶ As the Commission recognized in the *USF/ICC Transformation Order*, its ICC reform "was not 100 percent revenue-neutral relative to" prior revenues.⁷ However, the new mechanism "eliminates much of the uncertainty carriers face[d] under the existing ICC system, allowing them to make investment decisions based on a full understanding of their revenues from ICC for the next several years. Absent reform, price cap and rate-of-return carriers alike face[d] an increasingly unpredictable revenue stream from ICC, which will only get worse as demand for traditional telephone service continues to decline."⁸

In addition, the Draft Report states that "18 of the 30 RUS borrowers directly receiving high-cost support in 2011 received less support in 2013 than in 2011" and that "[t]hese 18 borrowers lost an average of 31 percent of their USF support over those 2 years."⁹ Without further information, we are unable to verify these figures or determine whether the 31 percent average, even if accurate, is skewed as a result of support reductions for a smaller number of carriers whose expenses were found to be unreasonably high. We also note that the Draft Report recognizes that decreases in support may be a result of line loss and other factors¹⁰ and that support to RUS borrowers increased overall between 2003 and 2013.¹¹

³ *Id.* at 26. Without a list of the carriers at issue, we cannot determine whether any carrier suffered a net loss of revenue.

⁴ *USF/ICC Transformation Order*, 26 FCC Rcd at 17677, para. 36.

⁵ *Id.* at 17962-63, para. 858.

⁶ *Id.* at 17988, para. 908.

⁷ *Id.* at 17956, para. 848.

⁸ *Id.*

⁹ Draft Report at 26.

¹⁰ *Id.* at 26 n.64.

¹¹ *Id.* at 24.

We thank the GAO for its time and effort working on this important matter and appreciate the opportunity to review and comment on the draft GAO Report.

Sincerely,

A handwritten signature in blue ink that reads "Julie A. Veach" followed by a stylized flourish that appears to be "MSJ".

Julie A. Veach
Chief
Wireline Competition Bureau

Appendix IV: GAO Contact and Staff Acknowledgments

GAO Contact

Mark L. Goldstein, (202) 512-2834 or goldsteinm@gao.gov

Staff Acknowledgments

In addition to the contact named above, Michael Clements (Assistant Director); Melissa Bodeau; Stephen Brown; Kyle Browning; Lorraine Ettaro; Georgeann Higgins; Bert Japikse; Tara Jayant; and John Mingus, Jr. made key contributions to this report.

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