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February, 2011

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Abstract

The universal service program in the United States currently transfers about \$7.5 billion per year from telephone subscribers to certain telephone companies. Those funds are intended to help achieve particular policy goals, such as subsidizing telephone service in rural areas and making phone service more affordable to low-income people. The bulk of the funds, about \$4.5 billion per year, subsidizes firms operating in high-cost areas. A large literature documents the inefficiency and ineffectiveness of these subsidies, raising the question of where the money goes. This paper uses data submitted by about 1,400 recipients of high-cost subsidies from 1998 – 2008 to explore this question. The analysis reveals that of each dollar distributed to recipient firms, about \$0.59 goes to “general and administrative expenses”—overhead such as planning, government relations, and personnel—rather than to making telephone service more affordable. These results, consistent with a large body of economics literature, suggest that the Universal Service Fund’s method for subsidizing service in high-cost areas should be radically overhauled as a key component of the current desire to shift USF support from voice to broadband.

* Vice President for Research and Senior Fellow, Technology Policy Institute. Contact: scott@wallsten.net. I thank James Riso for outstanding research assistance, and Robert Hahn, Arlene Holen, Thomas Lenard, and Amy Smorodin for comments. I am responsible for all opinions and errors.

1. Introduction

The universal service program in the United States currently transfers nearly \$7.5 billion per year from telephone subscribers, collected via taxes on telecommunications services, to certain telecommunications companies. The program's objectives are illustrated by its various component funds: high-cost, low-income, schools and libraries, and rural health communications (Figure 1). Of those, the largest share is for the high-cost program, which, according to the Universal Service Administrative Company (USAC), "ensures that consumers in all regions of the nation have access to and pay rates for telecommunications services that are reasonably comparable to those in urban areas."¹ Only about 14 percent of funds go to low-income programs.

Figure 1: Universal Service Expenditures

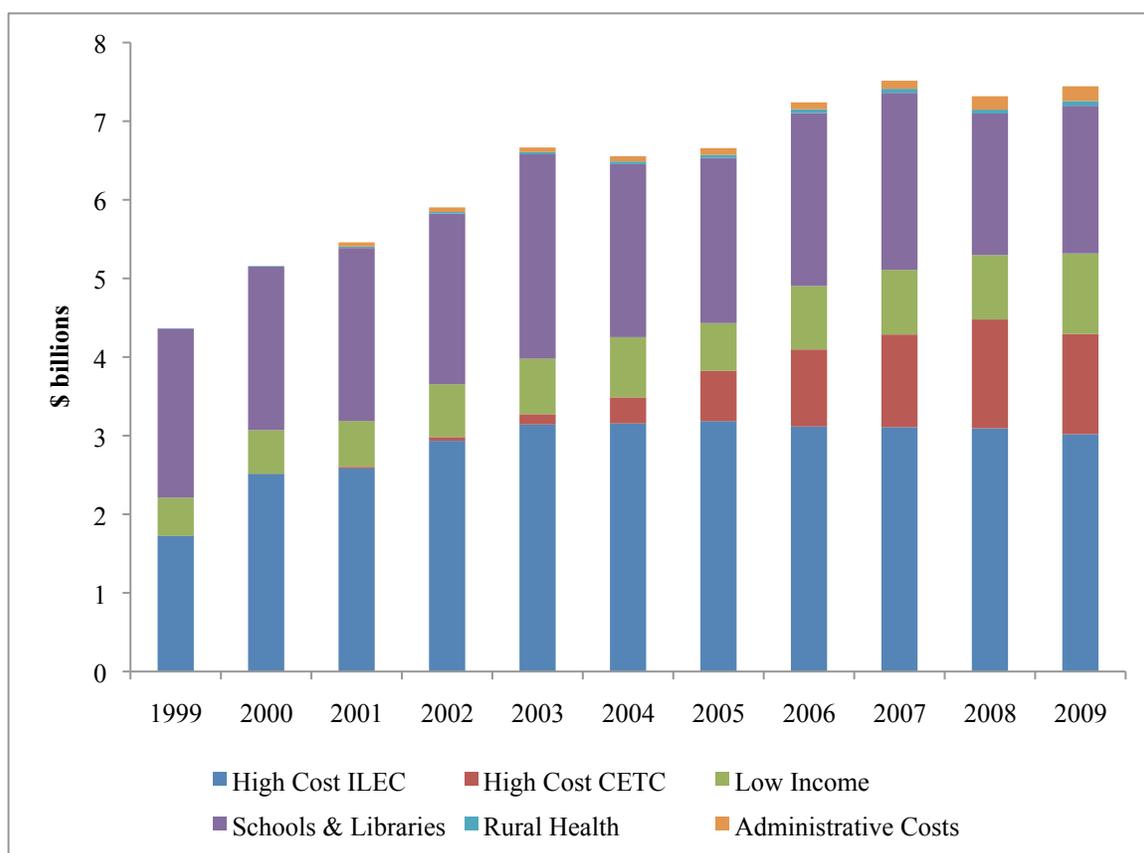
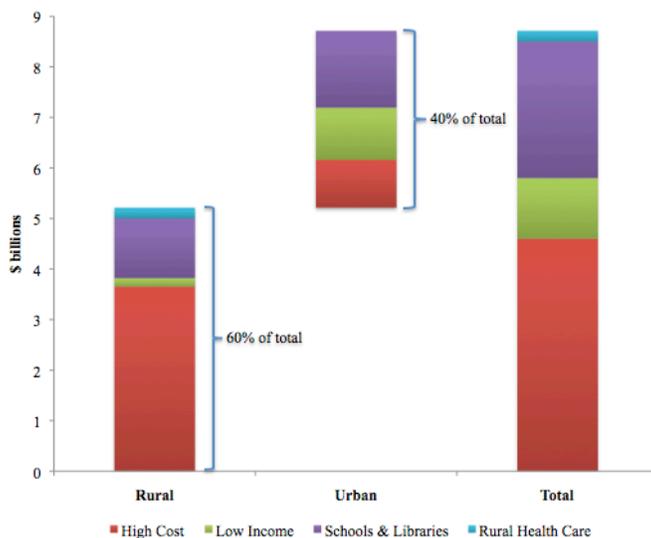


Figure 2 shows universal service expenditures by program and rural-urban classifications. About 60 percent of the total fund goes to programs in rural areas while only 40 percent goes to urban areas. The numbers tilt further in favor of rural areas when considering only programs targeting residential subscribers (high-cost and low-income support)—65 percent rural and 35 percent urban.

¹ <http://www.usac.org/about/usac/>

Figure 2: Rural-Urban Allocation of USF Dollars, FY 2010



Source: Derived from USAC and U.S. Census data.²

While the existing universal service program officially subsidizes only voice service, policymakers and others want to update the program to also include support for broadband service. The Federal Communications Commission’s National Broadband Plan endorsed that change, and the FCC recently began the formal process of changing the universal service program to include broadband by releasing a Notice of Proposed Rulemaking on February 9, 2011.³

Economics research overwhelmingly finds that despite its good intentions the existing high-cost program is ineffective, inefficient, and inequitable, as discussed below. This hat-trick of policy

² To the Universal Service Fund size projections in NBP Exhibit 8-E, applied rural/non-rural proportions derived as follows

High-cost: national totals of projected support for rural and non-rural study areas for 3Q2010 as given in USAC filing appendix HC01.

Low Income: applied indicator of rural or non-rural at the study area level as found in HC01 to 3Q2010 projected low-income support by study area given in filing appendix LI01. Excludes study areas projected to receive low-income support but which do not participate in the High-cost program, since they are not identifiable as rural or non-rural with this method. These make up approximately 40% of the total third quarter low-income support projection. Of the unidentifiable portion, approximately 90% are attributed to Tracfone Wireless.

Schools and Libraries: cross-referenced location of funding year 2009 commitments for 1Q2010 (appendix SL23) with Census Table 1 (<http://www.census.gov/popest/cities/tables/SUB-EST2009-01.csv>), which provides a list of U.S. incorporated places with over 100,000 residents. Classified matches as non-rural. Fixed typos and adjusted titles where applicable (e.g. disaggregated census’ “New York city” to New York, Bronx, Brooklyn, Flushing, Jamaica, Forest Hills, per USAC data).

Rural Health Care: assumed 100% rural.

³ Federal Communications Commission, *In the Matter of 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 an Unified Intercarrier Compensation Regime, Federal-State Joint Board on Universal Service Lifeline and Link-Up*, NPRM, February 9, 2009, http://www.fcc.gov/Daily_Releases/Daily_Business/2011/db0209/FCC-11-13A1.pdf.

ineptitude suggests two questions. First, why would any reasonable person consider basing support for broadband on such a poor foundation? Second, where has the money gone?

Given the nature of the policy process, the first question is rhetorical. This paper addresses the second question and examines how program funds are actually used. In particular, it uses detailed, wireline telephone company-level data to explore the relationship between payments from the universal service fund and company expenditures on benefits and administrative functions. The analysis finds that each dollar in high-cost subsidies given to an incumbent local exchange carrier (ILEC) is associated with an increase in general and administrative expenses of about \$0.59. Hence, policymakers should be skeptical about both spending more money on an inefficient program and extending the program to broadband without substantially reforming it first.

2. Universal Service in Theory and in Practice⁴

“Universal service” refers to the idea that an infrastructure utility, such as electricity, transportation, water, or telecommunications, should be available to everyone. Universal service policies typically have three rationales.⁵ First, externalities might make it economically efficient to subsidize prices for those who cannot afford the service at cost. Positive externalities imply that the total benefits from providing service to an individual exceed the benefits to an individual subscriber. If the private marginal cost of service exceeds the private marginal benefit by less than the amount of the external benefit, then some individuals will not subscribe even though the social benefit of serving them exceeds their cost of service. In that case, subsidizing service can be one way to achieve an efficient outcome.

Second, some services might be ‘merit goods’—goods and services that society believes everyone should have, regardless of whether they are willing to pay for those services. Policymakers may decide that certain goods and services should be subsidized because they believe everyone should achieve a certain minimum standard of living or that individuals are unable to accurately assess the private benefits of these services. If society is more concerned that the poor consume these merit goods than that they maximize their overall welfare, then subsidizing these goods might be preferable to direct pecuniary transfers because people may choose to spend cash transfers on something other than the service society wants to encourage.

Finally, political factors or regional development goals may induce government to transfer resources to rural or low-income constituents. In countries where rural areas are disproportionately represented, politicians may face political incentives to ensure that their rural constituents have access to the same services as do urbanites.

⁴ This section draws heavily from joint research with Roger Noll. Noll, Roger and Scott Wallsten. 2006. “Universal Service in India.” NCAER-Brookings *India Policy Forum*, Volume 2. Suman Bery, Barry Bosworth, and Arvind Panagariya, Eds.

⁵ Cremer, Helmuth et al. 1998. “The Economics of Universal Service: Practice.” *Economic Development Institute Discussion Paper*. Cremer, Helmuth et al. 1998. “The Economics of Universal Service: Theory.” *Economic Development Institute Discussion Paper*.

Rationale for Universal Service in Telecommunications

The typical economics argument in support of universal service policies in telecommunications is that inherent network externalities result in not enough service being provided or used. Network externalities mean that the benefits a new consumer accrues from connecting (the private benefits) are less than the total benefits to society, because when an additional person connects to the network all other subscribers benefit by being able to communicate with the new subscriber. Therefore, individuals may not face a strong enough incentive to subscribe, thus requiring subsidies to induce socially optimal subscription.

This argument, however, is incomplete and therefore misleading. Even if the benefits to the new subscriber are less than the total benefits, the private benefit may still exceed the cost for nearly all subscribers, in which case a general subsidy of service is mostly wasted. Second, because services become more valuable when more people are connected, the firm providing access captures some of the benefits from network externalities. Consequently, although network externalities are external to the individual, they are not necessarily external to firms providing the service, potentially removing the need for subsidies. In other words, network externalities by themselves do not necessarily imply telecommunications under-subscription. Third, all subscribers receive an external benefit from subscriptions by others, implying that each person should subsidize the service of the other. Consequently, on average the subsidy a subscriber receives to take service ought to be roughly equal to the amount of subsidy that subscriber should be willing to pay to induce others to subscribe.

3. High-Cost Universal Service in Practice: Costly, Ineffective, and Inequitable

Even if one disregards the point that the theoretical justification for subsidies is weak and believes that subsidies are nevertheless required, the manner in which we pay for those subsidies has historically been inefficient and even counterproductive. In particular, we pay for universal service subsidies by taxing other telecommunications services—in other words, via cross-subsidies.

Cross-subsidies in telecommunications are inefficient and costly to society in large part because they tax usage—such as long distance and mobile calls—which have relatively high price-elasticities of demand, in order to subsidize access, which has a very low price-elasticity of demand. In other words, our system of funding universal service taxes services for which people are highly price sensitive, causing them to change their behavior and use those services less than they otherwise would. Hausman (2000) estimated that each dollar raised in taxes on wireless services cost the economy between \$0.72 and \$1.12.⁶ Ellig (2005) estimated that the taxes on wireless services and interstate long-distance to support universal service reduced economic welfare in 2002—when subsidies were lower than they are now—by nearly \$2 billion.⁷

⁶ Jerry Hausman, *Efficiency Effects on the U.S. Economy from Wireless Taxation*. 53 NAT'L TAX J. 733, 735 (2000).

⁷ Ellig, Jerry. 2005. "Costs and Consequences of Federal Telecommunications Regulations" *Federal Communications Law Journal*. Vol 58, No. 1pp. 37-102.

At the same time, those taxes are used to subsidize *access*, which people are likely to purchase even when prices change. Rosston and Wimmer (2000), for example, estimated in a detailed empirical analysis that eliminating the high-cost fund would reduce telephone penetration by only one-half of one percent.⁸ That estimate is likely to be even smaller today given increased competition and lower costs. Eriksson, Kaserman, and Mayo (1998) similarly find payments from the high-cost fund to be uncorrelated with rural telephone penetration but find that low-income subsidies do appear to have positive effects on telephone penetration.⁹ Rosston and Wimmer (2000) point out the inequity of the universal service program: 80 percent of poor households pay into the fund through taxes on telecommunications services they use and get nothing back.¹⁰

High-Cost Subsidies

High-cost support has a long history, dating back to a system of cross-subsidies that came to maturity in the 1950s under AT&T's regulated monopoly.¹¹ At that time, the local monopolies of the Bell system were able to offer rural subscribers affordable rates by recouping losses on high-cost service with surplus revenues earned from overpricing other services, like long-distance calls. Following the breakup of AT&T, this sort of implicit universal service support became untenable—competition would force down artificially high rates for long-distance and business users, preventing firms from recovering high-costs internally. Policymakers responded with a regime of regulated “access charges” designed to channel revenue from long-distance operators to local networks so the latter could maintain below-cost pricing when necessary. Through the course of deregulation in U.S. telecommunications, the access charge system has gradually been disassembled in favor of direct subsidization for high-cost networks. The trend is evident in policies stemming from the Telecommunications Act of 1996. The 1996 Act aimed principally to increase competition but reaffirmed the doctrine of universal service, stating:

“Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high-cost areas, should have access to telecommunications and information services...at rates that are reasonably comparable to rates charged for similar services in urban areas.”¹²

The system of subsidies that developed through that legislation and related rulemakings has been widely criticized. A range of analysts, interest groups, and policymakers have called for reform of federal universal service in general, and high-cost assistance in particular. The Federal State Joint Board on Universal Service,¹³ the 2010 National Broadband Plan,¹⁴ and the FCC¹⁵ have

⁸ Gregory Rosston and Bradley Wimmer, “The ‘State’ of Universal Service,” *Information Economics and Policy* 12, no. 3 (2000): 261-283.

⁹ Ross Eriksson, David Kaserman, and John Mayo, “Targeted and Untargeted Subsidy Schemes: Evidence from Postdivestiture Efforts to Promote Universal Telephone Service,” *Journal of Law and Economics* 41, no. 2, Part 1 (1998): 477-502.

¹⁰ Rosston and Wimmer, “The ‘State’ of Universal Service.”

¹¹ Kaserman and Mayo (1997) provide a nice history of the universal service program. David Kaserman and John Mayo, “The Question for Universal Telephone Service: The Misfortunes of a Misshapen Policy,” in *Telecommunications Policy: Have Regulators Dialed the Wrong Number?* (Praeger Publishers, 1997).

¹² 47 U.S.C. § 254(b)(3).

¹³ National Exchange Carriers Association, *Annotated Version of Code of Federal Regulations, Title 47, Part 54 -*

endorsed reform. Recently, Congress recently indicated its interest in pursuing USF reform¹⁶ and the FCC released a notice of proposed rulemaking regarding reforming USF.¹⁷

Overview of the High-Cost Fund

High-cost is the most expensive of the four divisions of the federal universal service fund (USF).¹⁸ Since 1986, the federal government has paid out almost \$48 billion in high-cost support (not adjusted for inflation).¹⁹ Over \$39 billion of that total was distributed in 1998 or later—including almost \$6 billion to wireless competitive local exchange carriers (CETCs), and \$100 million to wireline CETCs. Funds are collected through fees on users of long-distance (interstate and international) and VoIP services nationwide. The rate, or “contribution factor,” for this fee is set by the Universal Service Administrative Company (USAC), the not-for-profit administrator of federal universal service. The USAC revises this funding method quarterly to adhere to the needs of the high-cost and other USF programs. In 2000 this fee was as low as 5.5 percent, but, as Figure 3 shows, it has since increased significantly and is now 15.5 percent.

Universal Service, 2009, 7.

¹⁴ Federal Communications Commission, *National Broadband Plan: Connecting America* (Washington, DC, March 2010), <http://www.broadband.gov/>.

¹⁵ Federal Communications Commission, *FCC Proposes Modernizing and Streamlining Universal Service*, February 8, 2011, http://www.fcc.gov/Daily_Releases/Daily_Business/2011/db0208/DOC-304522A1.pdf.

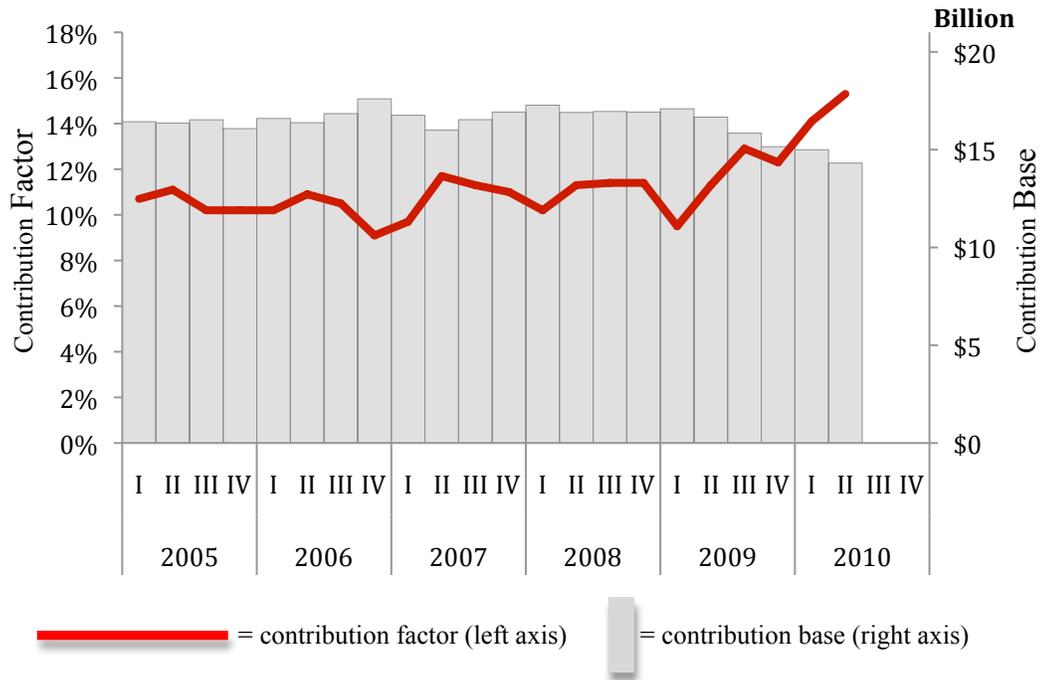
¹⁶ <http://techdailydose.nationaljournal.com/2011/01/terry-sees-role-for-congress-o.php>

¹⁷ Federal Communications Commission, *In the Matter of 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 an Unified Intercarrier Compensation Regime, Federal-State Joint Board on Universal Service Lifeline and Link-Up*.

¹⁸ The other divisions are Low Income (which provides discounts to qualifying consumers for telephone expenditures through the Link-Up and Lifeline programs), Schools and Libraries (which provides affordable telecommunications to qualifying organizations, especially in economically disadvantaged areas), and the Rural Health Care program (which funds rural health care providers for telecommunications service, including broadband).

¹⁹ Includes 2009 “projection,” calculated from *Monitoring Report* Table 3-1 [\$47854.35 mi.]

Figure 3: Contribution Factor and Base



High-cost funding is distributed through several specific programs, each with different methods of encouraging high-cost service and eligibility requirements. Table 1 summarizes the major components of the High-Cost Fund (HCF).²⁰

²⁰ Table 1 is a simplified presentation of complex high-cost funding mechanisms.

**Table 1
High-Cost Fund Programs**

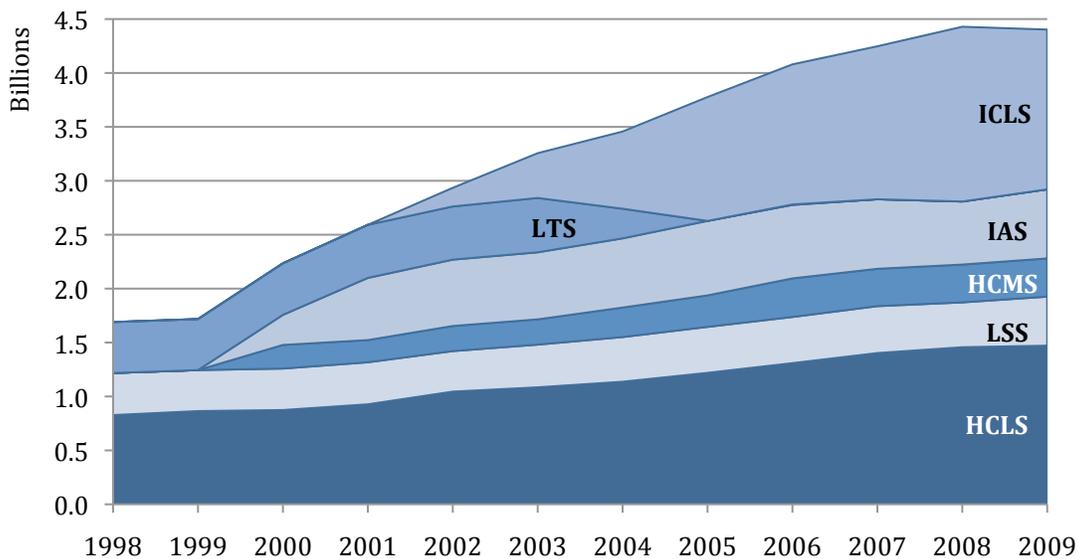
Program	Eligibility	Goal	% of HCF (1998-2009)
HCLS <i>High-cost Loop Support</i>	<u>Rural carriers</u> with average per-line cost \geq 15% above the national average.	Support non-traffic sensitive local loop costs. Supplemented by SVS and SNAS. ^[a]	35%
HCMS <i>High-cost Model Support</i>	<u>Non-rural carriers</u> in states where statewide average per-line costs are significantly above national average.	Keep the price of telephone service comparable in all areas of a given state.	7%
LSS <i>Local Switching Support</i>	<u>Rural carriers</u> that serve \leq 50,000 access lines.	Defray high switching costs of small carriers.	13%
ICLS <i>Interstate Common Line Support</i>	<u>Rate-of-return carriers</u> (rural and non-rural)	Ensure reasonably affordable interstate rates. Long Term Support (LTS), which also related to interstate traffic costs, was replaced by ICLS in July 2004.	29% ^[b]
IAS <i>Interstate Access Support</i>	<u>Price-cap carriers</u> (rural and non-rural)	Analogous to ICLS. Supports companies serving areas where caps do not permit recovery of common line revenue requirements.	15%

[a] SVS and SNAS discussed below.

[b] Proportion is sum of ICLS and now-defunct LTS.

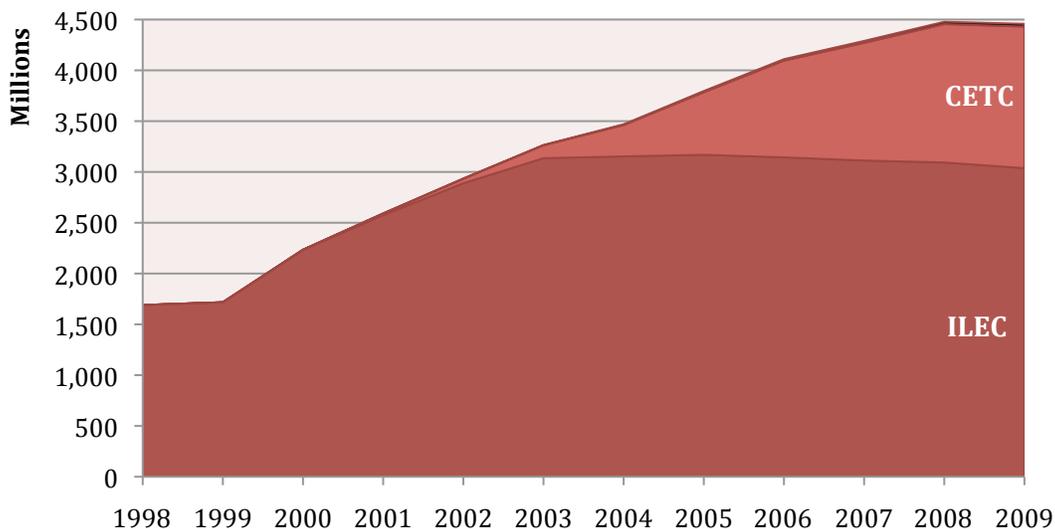
Figure 4 tracks the size of these major funding mechanisms on an annual basis over the last decade.

Figure 4: High-Cost Fund Payments by Program



An initial inherent problem with high-cost support was that it funded only a single provider under the implicit assumption that telecommunications service was a natural monopoly. Whether that was ever true is subject to debate, but is almost certainly not true when considering wireless providers. The 1996 Telecommunications Act tried to address this issue by opening up the system to entrants, called competitive eligible telecommunications carriers or CETCs, which could receive the same per-line subsidy as the incumbent. As Figure 5 shows, subsidies to CETCs increased rapidly. Partially in response to that rapid increase, high-cost support to competitive eligible telecommunications carriers (CETCs) was capped as of August 1, 2008 at the level of support CETCs in that state were eligible to receive in March 2008 (annualized).²¹

Figure 5: High-Cost Fund Payments to Incumbents and Entrants



Setting aside the question of how to balance entrants and incumbents, the FCC itself has recognized that a large share of high-cost funds are, at best, misallocated. In particular, the FCC’s Office of Inspector General estimated in a review of 2007/2008 data that 23.3 percent, or about \$1 billion, was paid out “erroneously.”²² The next section explores empirically the question of potentially misallocated funds.

4. Where Do High-cost Payments Go?

The high-cost fund creates certain perverse incentives for firms that participate. In particular, because subsidies are a function of a firm’s costs, the firm has little incentive to reduce its costs. Two recent papers, for example, find that high-cost fund recipients face incentives to inflate and

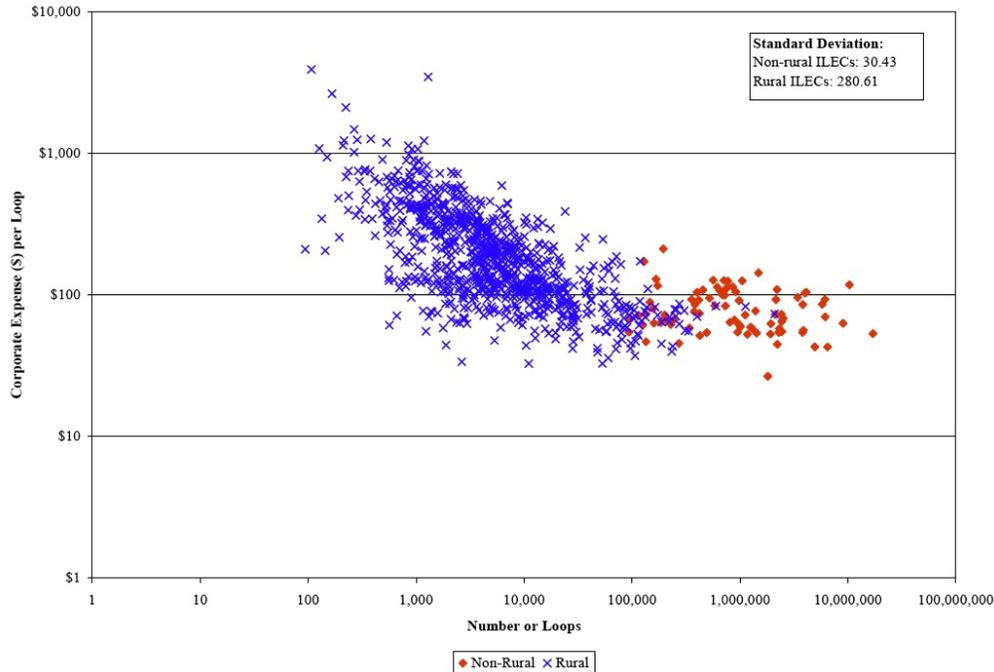
²¹ See *High-Cost Universal Service Support; Federal-State Joint Board on Universal Service*, WC Docket No. 05-337, CC Docket No. 96-45, Order, 23 FCC Rcd 8834 (2008) (*Interim Cap Order*); available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-08-122A1.pdf

²² Office of Inspector General, *The High-cost Program: Initial Statistical Analysis of Data from the 2007/2008 Compliances Attestation Examinations* (Federal Communications Commission, November 26, 2008), http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-286971A1.pdf.

misreport costs.²³ If, as Rosston and Wimmer (2000) found, high-cost subsidies have little real effect, where have the approximately \$40 billion distributed over the past decade gone?

Hazlett (2006) provided much of the answer.²⁴ In particular, he showed that rural carriers tend to have higher corporate overhead rates than do non-rural carriers (Figure 6).

Figure 6
Rural and Non-Rural Carriers Corporate Expense
Per Line and Number of Lines (logarithmic scale) (2004)



Source: Hazlett (2006), Figure 8, Data from NECA file USF2005LC05.xls;
<http://www.fcc.gov/wcb/iatd/neca.html>.

It is conceivable that overhead costs per line are inherently higher for smaller firms than for larger until some minimum scale is achieved. Fortunately, detailed data make it possible to examine the direct relationship between high-cost payments and these overhead expenditures.

Data

The FCC requires universal service recipients to submit detailed data on their costs and expenses to the National Exchange Carrier Association (NECA) each year, while the FCC has data on disbursements from the high-cost fund to those recipients. For our analysis, we focus only on ILECs (wireline) and not wireless since CETCs do not report the same data to NECA. We

²³ Berg, Sanford, Liangliang Jiang, and Chen Lin. 2010a. Universal Service Subsidies and Cost Inflation: Evidence from the U.S. Telecommunications Sector. July 13.

———. 2010b. Incentives for Cost-Shifting and Misreporting: U.S. Rural Universal Service Subsidies, 1991-2002. October 19.

²⁴ Hazlett, Thomas. 2006. "Universal Service" Telephone Subsidies: What Does \$7 Billion Buy?

combine information from those two sources to construct a firm-level dataset on high-cost recipients from 1998 through 2008. The dataset includes information on how much each telephone company received in high-cost subsidies, the number of loops and exchanges each firm owns, the firm's reported costs, and the firm's reported expenditures on different parts of its operations.

The dataset contains information on about 1,400 recipients of high-cost funds over the ten year span.²⁵ This paper focuses specifically on the relationship between high-cost subsidies and “general and administrative expenses.” This relationship is potentially instructive for two reasons. First, the two should be unrelated if universal service funds were being used to subsidize the high costs of building and operating infrastructure. That is, while it is possible that these per-line overhead costs might be higher for smaller firms, they should not be related to the magnitude of universal service funds received when controlling for firm size.

Second, these overhead costs are perhaps the broadest category not directly related to capital and operation costs. If funds are being misused we might expect to find them being shifted to these expenses. The official definition of these funds explains what they can include. The Code of Federal Regulations (§32.6720) notes that “general and administrative expenses” includes (bullets are quotes):²⁶

- Formulating corporate policy and in providing overall administration and management. Included are the pay, fees and expenses of boards of directors or similar policy boards and all board-designed officers of the company and their office staffs, e.g., secretaries and staff assistants.
- Developing and evaluating long-term courses of action for the future operations of the company. This includes performing corporate organization and integrated long-range planning including management studies, options and contingency plans, and economic strategic analysis.
- Providing accounting and financial services.
- Maintaining relations with government, regulators, other companies and the general public. This includes:
 - Reviewing existing or pending legislation (See also Account 7300, Nonoperating income and expense, for lobbying expenses).
 - Preparing and presenting information for regulatory purposes, including tariff and service cost filings, and obtaining radio licenses and construction permits;
 - Performing public relations and non-product-related corporate image advertising activities;
 - Administering relations, including negotiating contracts, with telecommunication companies and other utilities, businesses, and industries. This excludes sales contracts (See also Account 6611, Product management and sales.); and
 - Administering investor relations.
- Performing personnel administration activities.
- Planning and maintaining application systems and databases for general purpose computers.
- Providing legal services. This includes conducting and coordinating litigation, providing guidance on regulatory and labor matters, preparing, reviewing and filing patents and contracts and interpreting legislation. Also included are court costs, filing fees, and the costs of outside counsel, depositions, transcripts and witnesses.
- Procuring material and supplies, including office supplies.
- Making planned search or critical investigation aimed at discovery of new knowledge.

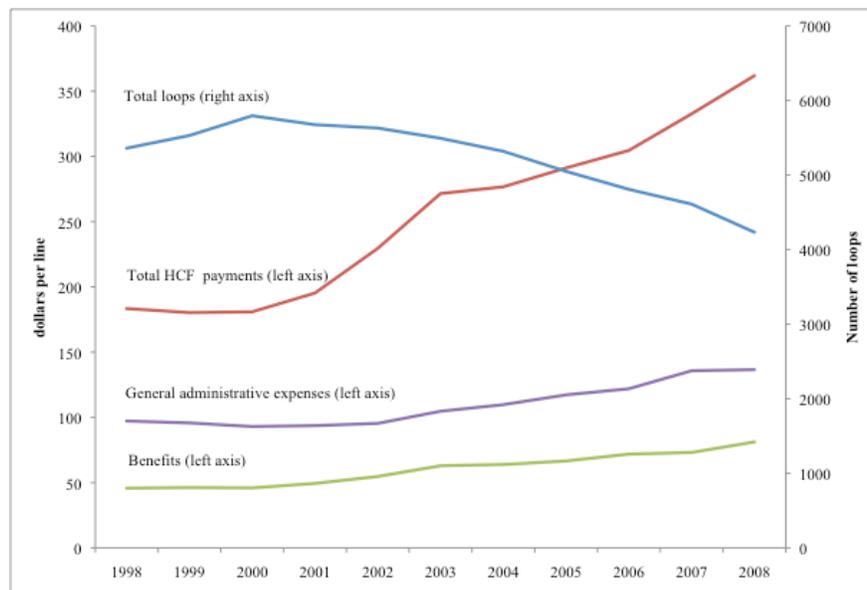
²⁵ The number of firms in the dataset varies slightly by year, from a low of 1,396 in 1998 to 1,452 in 2008.

²⁶ https://prodnet.www.neca.org/sslappsource/GTR/NECA_GTR.asp?gtr32_6720

- Performing general administrative activities not directly charged to the user, and not provided for in paragraphs (a) through (i) of this section. This includes providing general reference libraries, food services (e.g., cafeterias, lunch rooms and vending facilities), archives, general security investigation services, operating official private branch exchanges in the conduct of the business, and telecommunications and mail services. Also included are payments in settlement of accident and damage claims, insurance premiums for protection against losses and damages, direct benefit payments to or on behalf of retired and separated employees, accident and sickness disability payments, supplemental payments to employees while in governmental service, death payments, and other miscellaneous costs of a corporate nature. This account excludes the cost of office services, which are to be included in the accounts appropriate for the activities supported.

Figure 7 shows the median number of loops, high-cost fund (HCF) payments per line, general and administrative expenses per line, and benefits per line paid to employees as part of those expenses.

Figure 7: Loops, HCF Payments, and Expenses of ILEC HCF Recipients

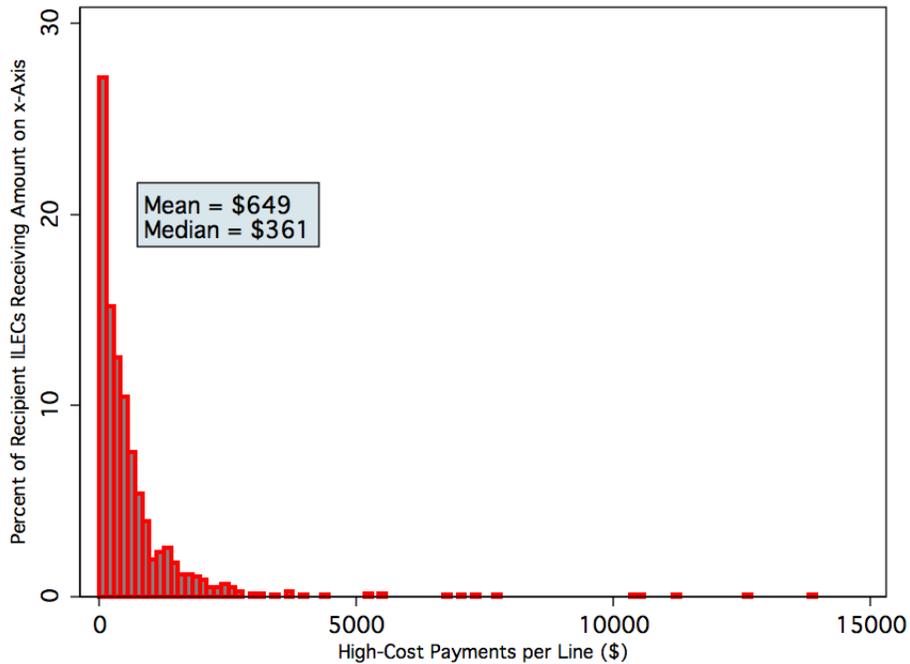


The figure shows the declining number of loops for the median ILEC each year due to the by now well-known phenomenon of subscribers disconnecting landline phones and instead relying on wireless voice service. Because total payments from the high-cost fund have remained relatively constant, payments per line have radically increased. Similarly, ILEC expenditures on “general administrative” and “benefits” per line have also steadily increased.

High-cost payments per line vary considerably across firms, as Figure 8 demonstrates. The mean and median payments per line in 2008 were \$649 and \$361, with some firms receiving annual payments exceeding \$10,000 per line. The FCC noted that some firms have received annual subsidies exceeding \$20,000 per line.²⁷

²⁷ http://www.fcc.gov/Daily_Releases/Daily_Business/2011/db0208/DOC-304522A1.pdf

Figure 8: Distribution of High-Cost Payments to ILECs, 2008



Note: The figure understates subsidies because I eliminated the top one percent of payments from the sample to help ensure that outliers did not drive the results.

Analysis

As discussed earlier, a great deal of research demonstrates that our universal service program, and particularly subsidies targeted to high-cost areas, is inefficient because it is funded by taxing usage to provide access. Other research has suggested that the system reduces incentives for recipients to operate efficiently because firms have incentives to inflate and misreport costs. This paper tests the latter hypothesis. In particular, I ask whether payments from the high-cost fund are correlated with expenditures on company benefits and administrative expenses, both of which recipients self-report.

Using the data described above, I estimate two versions of the following equation, once where y is total general and administrative expenses and once where y is the portion of those general and administrative expenses paid in a category the firm labels as “benefits.”

$$y_{it} = f(\text{high-cost fund payments}_{it}, \text{total number of loops}_{it}, \gamma_i, \delta_t)$$

In this equation i indicates a firm (an ILEC recipient) and t indicates the year, meaning that γ_i controls for firm fixed effects and δ_t controls for year fixed effects. I estimate the equation with the variables expressed as dollars per loop as well as the actual levels themselves. I control for the total number of loops even when the other variables are measured per line to control for the possibility that the size of the provider affects its inherent underlying efficiency.

The year and firm fixed effects are crucial control variables. The year fixed effects control for time trends as well as any changes unique to a particular point in time rather than the firms' own behavior. The firm fixed effects capture factors unique to the firm that cannot otherwise be observed in the data, such as particular factors that might affect costs for a particular firm.

Controlling for the firm fixed effects and number of loops (firm size) we should not expect to see any correlation between payments from the high-cost fund and general and administrative expenses.

Table 2 shows the results of estimating this equation. The estimates suggest that each dollar of payments from the high-cost fund is associated with an increase of about \$0.59 in a recipient ILEC's general and administrative expenses. Of that \$0.59, about \$0.24 goes to benefits paid by the ILEC related to those expenses.

Table 2
Regression Results: High-Cost Fund Payments and ILEC Overhead

	General and administrative expenses		Benefits portion of general and admin expenses	
	total	per line	total	per line
High-cost fund payments per line		0.03 (10.83)**		0.003 (7.54)**
High-cost fund payments, total	0.585 (8.68)**		0.237 (4.56)**	
Total loops (thousands)	1156 (0.91)	0.019 (1.82)+	16720 (17.02)**	0.0052 (3.35)**
year=1999	-1,495,047 (2.07)*	-7.39 (1.26)	-76,065 (0.14)	-0.198 (0.23)
year=2000	-2,233,397 (3.12)**	-12.52 (2.15)*	-1,172,571 (2.12)*	-0.516 (0.59)
year=2001	-1,087,335 (1.52)	-9.01 (1.56)	536,899 (0.98)	1.463 (1.70)+
year=2002	1,028,135 (1.44)	-2.60 (0.45)	1,538,474 (2.80)**	3.58 (4.17)**
year=2003	3,643,257 (5.11)**	5.99 (1.04)	3,057,130 (5.56)**	6.335 (7.38)**
year=2004	2,063,865 (2.90)**	18.89 (3.29)**	1,342,440 (2.44)*	6.537 (7.62)**
year=2005	247,684 (0.35)	33.04 (5.75)**	804,853 -1.47	8.357 (9.75)**
year=2006	420,297 (0.59)	40.52 (7.06)**	861,885 -1.58	11.171 (13.05)**
year=2007	-351,840 (0.50)	45.07 (7.84)**	811,779 -1.49	9.826 (11.45)**
year=2008	-939,381 (1.32)	53.16 (9.18)**	1,119,278 (2.04)*	13.658 (15.80)**
Constant	8,587,092 (14.77)**	143.665 (30.70)**	-2,859,288 (6.37)**	9.38 (13.44)**

Observations	10555	10555	10555	10555
R-squared	0.94	0.82	0.62	0.67
Absolute value of t statistics in parentheses				
+ significant at 10%; * significant at 5%; ** significant at 1%				
Firm fixed effects included, but not shown.				

The coefficient on the variable representing the number of loops owned by the ILEC suggests that the size of the firm itself is related to general and administrative expenses in some ways. Because the regression controls for firm fixed effects, this coefficient does not simply reflect expenses increasing with firm size. Instead, the coefficient should be more related to efficiency. That is, when controlling for firm fixed effects one would expect that scale efficiencies would mean that the number of loops is negatively correlated with general and administrative costs, especially when measuring per-line expenses. That is, one might expect to see lower per-line overhead expenses as firms increase in size. Instead, these results imply that overhead expenses *increase* with firm size.

One possible, though unsatisfactory, explanation for this counterintuitive result is that scale is better measured by some variable other than the number of loops and therefore is captured by the firm fixed effects rather than by the number of loops.

Regardless of the explanation for the number of loops coefficient, the firm fixed effects and the loops variable mean that firm size does not explain why firms that receive more high-cost funds spend more on overhead.

5. Discussion and Conclusion

This analysis suggests that on average \$0.59 of every dollar in high-cost subsidies given to recipient ILECs goes to inflated overhead expenses. That result holds even controlling for firm size and firm fixed effects. That is, more than half of all high-cost funds end up paying for goods and services that are unrelated to the goals of the program.

This paper is another in a long series of analyses demonstrating the inefficiency of the high-cost fund and the need for radical overhaul. The FCC's intention to switch the focus of USF from voice to broadband presents an opportunity that should not be overlooked. Even setting aside the politics of universal service (i.e., well-represented rural interests versus relatively poorly-represented low-income urban interests), certain reforms are crucial. Perhaps the most useful reform, based on what we know about adoption and elasticities of different technologies, would be to focus more on low-income people and less on high-cost areas.

To the extent that the universal service program continues to subsidize high-cost areas, however, the universal service program can take several steps to make it more efficient. First, the program should explicitly consider the use and cost-effectiveness of satellite broadband, especially considering that the soon-to-be-available next generation of satellites will offer download speeds of between 5 and 25 Mbps.²⁸ Second, a more efficient universal service program would not rely on cost-based, rate-of-return regulation. Rate-of-return regulation eliminates the incentive for

²⁸ Federal Communications Commission, *National Broadband Plan: Connecting America*, note 4:19.

firms to operate efficiently and creates incentives to inflate reported costs.²⁹ Third, to the extent that the Fund will subsidize multiple providers in an area, it should set the subsidy amount to be equal to that necessary for the lowest-cost provider, not to whatever the incumbent already receives.

Finally, the Commission should consider using auctions to define the level and distribution of subsidies, as a large number of economists and others have advocated.³⁰ The Commission would have to design the auctions carefully to, for example, handle cases in which only one or no providers submit bids, and address outstanding issues such as what to do in cases where the “provider of last resort” does not win the auction. Nevertheless, the worst outcome of a well-designed process would be the status quo, in which a single firm gets a subsidy that is not based on a competition.

The current universal service system is broken. This paper, which finds that more than half of all high-cost subsidies go to overhead expenses unrelated to program goals, is simply one more in a long line of research demonstrating the inefficiency of the program. The widespread belief among policymakers that it should evolve from subsidizing voice to subsidizing broadband presents an unprecedented opportunity for reform. We should not let this opportunity pass us by.

²⁹ The inefficiencies of rate-of-return regulation have been well documented. See, eg, Ronald R Braeutigam and John C Panzar, “Effects of the Change from Rate-of-Return to Price-Cap Regulation,” *American Economic Review* 83, no. 2 (May 1993): 191-98.

³⁰ Wallsten, Scott. 2009. Reverse Auctions and Universal Telecommunications Service: Lessons from Global Experience. *Federal Communications Law Journal* 61, no. 2 (March).
Milgrom, Paul, Gregory Rosston, Andrzej Skrzypacz, and Scott Wallsten. 2009. *Comments of 71 Concerned Economists: Using Procurement Auctions to Allocate Broadband Stimulus Grants*.