

## APPENDIX C1: RATES IN NON-RURAL CARRIER WIRE CENTERS

The dataset included here provides descriptive statistics for 11,252 non-rural company wire centers. All non-rural companies, with the exception of Puerto Rico Tel. Co. - Central (SAC 633200) and Puerto Rico Tel. Co. (633201), are included in the census. According to the 2000 census, slightly over 261,000,000 people reside in homes located in the service territory of these wire centers. Since the total population of the country in 2000 was 281,421,906,<sup>1</sup> our data set provides rates for approximately 93% of the U.S. population.

We collected the data set by obtaining residential service recurring local rates from a commercial vendor. We then supplemented this rate data with additional pricing information provided by NASUCA members and from non-rural company websites. Census data was used in identifying the degree to which the service territory of a wire center was urban or rural.

The pricing data is mostly for flat-rate residential service. We have focused on this rate because it is the rate structure selected by the vast majority of households. For those localities where flat-rate service is unavailable we have added an estimate of usage charges to the dial tone rate.

Our database covers many more areas in the nation than the FCC's *Reference Book of Rates, Price Indexes, and Household Expenditures for Telephone Service* (hereafter *Reference Book*). The *Reference Book* contains rate information for 95 urban areas of the United States. Our database includes rate information for significantly more urban areas, as well as rural and suburban areas. The FCC collects pricing data for a select number of urban areas, from which an analyst can draw inferences. Our dataset, on the other hand, is best characterized as a census because we have pricing information for almost every non-rural carrier's wire center in the United States.

The *Reference Book* data does contain information that is not part of our analysis. We report herein the price of local telephone service, the federal subscriber line charge, and the Federal Universal Service Fund (FUSF) tax. We do not include data for other local and state surcharges, or state subscriber line charges. The absence of this information is not a major

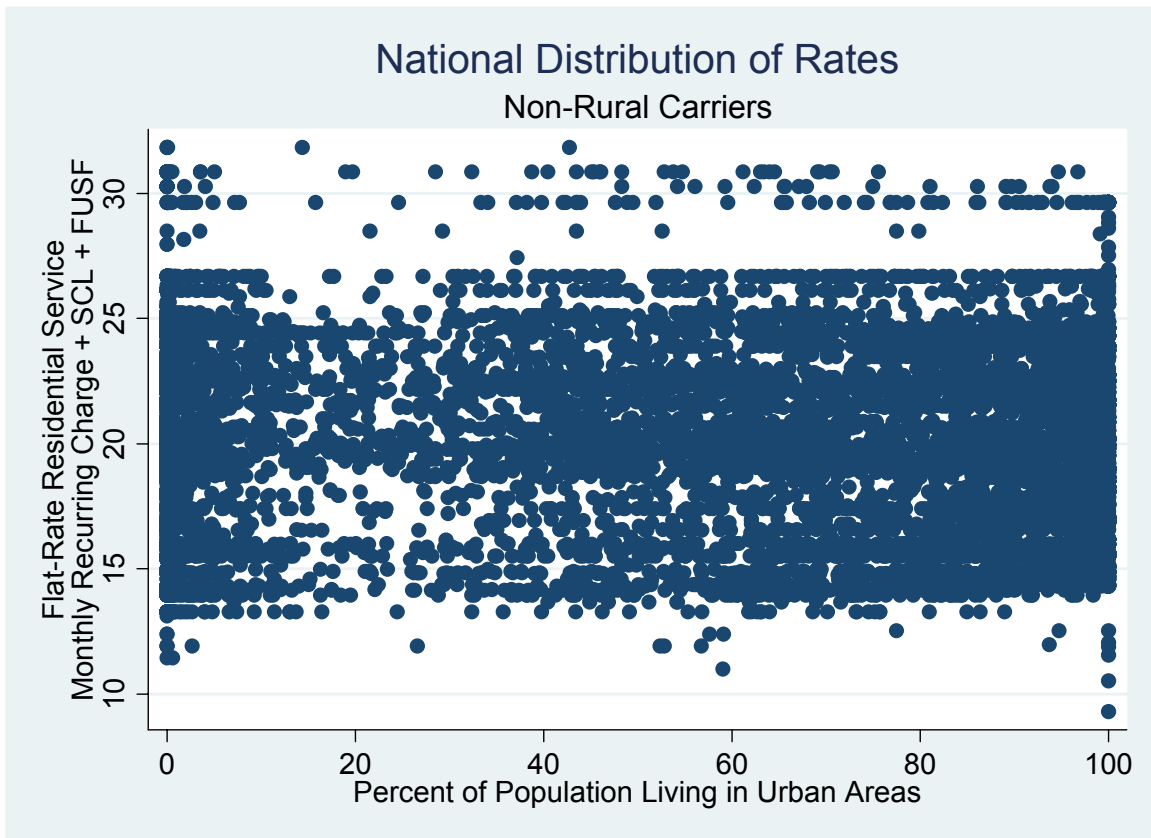
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[http://factfinder.census.gov/servlet/SAFFacts?\\_event=&geo\\_id=01000US&\\_geoContext=01000US&\\_street=&\\_county=&\\_cityTown=&\\_state=&\\_zip=&\\_lang=en&\\_sse=on&ActiveGeoDiv=&\\_useEV=&pctxt=fph&pgsl=010&\\_submenuId=factsheet\\_1&ds\\_name=null&\\_ci\\_nbr=null&q\\_r\\_name=null&reg=null%3Anull&\\_keyword=&\\_industry=](http://factfinder.census.gov/servlet/SAFFacts?_event=&geo_id=01000US&_geoContext=01000US&_street=&_county=&_cityTown=&_state=&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=010&_submenuId=factsheet_1&ds_name=null&_ci_nbr=null&q_r_name=null&reg=null%3Anull&_keyword=&_industry=)

shortcoming because of the high-correlation, 93%, between the sum of the price of basic exchange service and the federal SLC, and the total local rate reported by the FCC. This high correlation suggests that the variation we observe in our data set explains a large part of the variation rate variation reported in the *Reference Book*.

The following graph shows the price of residential flat-rate service plus the federal subscriber line charge and FUSF fee charged by non-rural companies. Each point represents one non-rural wire center.



The X axis show the percent of the territory classified as urban and the Y axis is the price of residential access flat-rate service.

The following table provides the average price of flat-rate residential exchange service as a function of urbanization. Each row identifies the proportion of the population living in an urban area. In constructing these averages, we weighted the rate in each wire center by the percentage of the population that resided in the wire center.

Percent of the population living in urban areas	Number of Wire Centers	Average price of flat-rate residential service + SLC + FUSF	Standard deviation	Minimum	Maximum	Average Population	Total Population	Percentage of population
0	1,808	21.00	3.79	11.43	31.82	2,611	4,721,471	
0-20%	3,979	20.81	3.76	11.43	31.82	3,332	13,259,982	
20-40%	545	20.47	3.56	11.91	30.86	10,295	5,610,606	
40-60%	1057	20.42	3.72	10.99	31.82	12,291	12,991,492	
60-80%	1,393	20.34	3.71	12.54	30.86	16,876	23,507,836	
80-100%	4,278	19.40	3.86	9.29	30.86	48,134	205,915,241	
100%	1092	19.57	4.20	9.29	29.64	58,861	64,275,873	
Sample avg. (0-100%)	11,252	19.63	3.85	9.29	31.82	23,221	261,285,167	

The mean value for each of the wire centers categories identified in the Table fall into the confidence region associated with the FCC's urban rates study. The FCC's 2005 Reference Book data supports a finding that the mean urban residential flat rate plus SLC is \$20.20 with a standard deviation of \$3.96. Hence if we assume the data are normally distributed, or rely on Tchebysheff's theorem,<sup>3</sup> we reach the conclusion that our sample data is consistent with the FCC's study of urban rates.

Other important statistical properties of the table include:

- The range<sup>4</sup> of rates does not vary greatly as a function of urbanization.

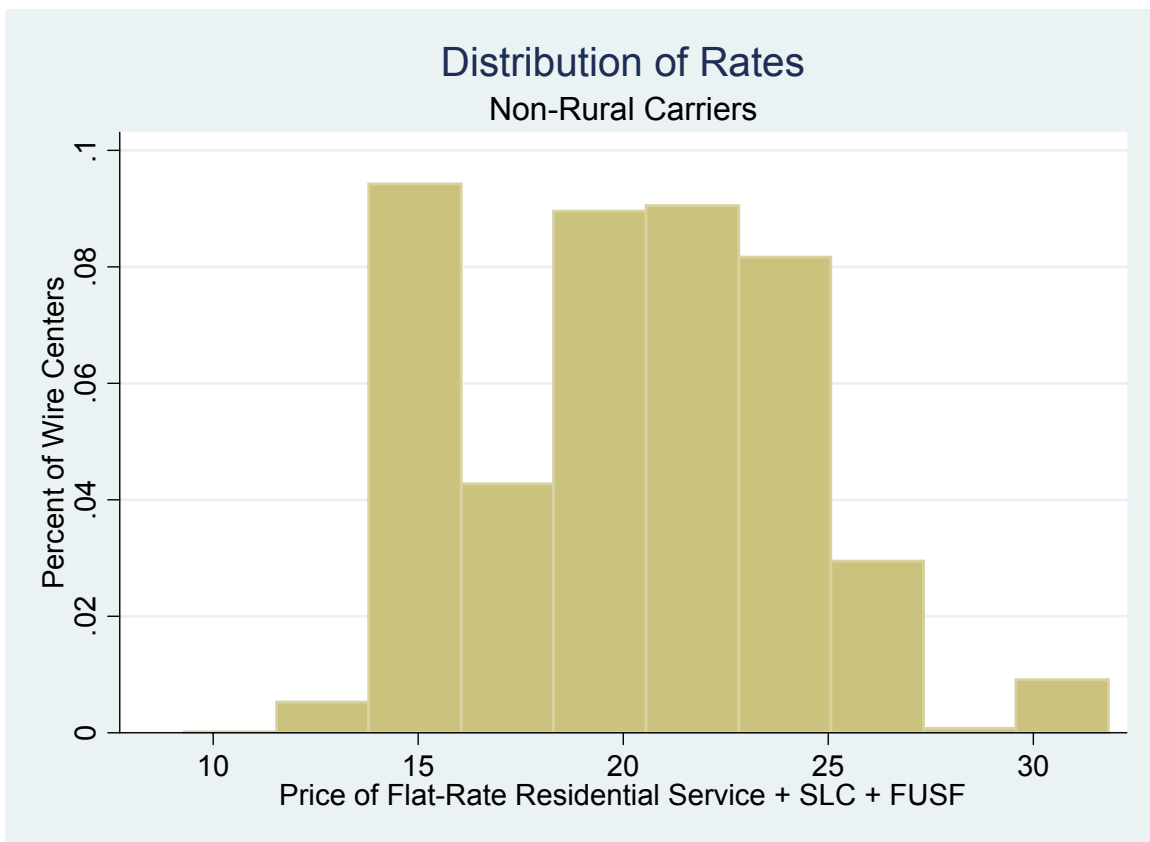
<sup>2</sup> The 0 and 100 % urban row values are included in the 0-20% and 80-100% rows, respectively.

<sup>3</sup> Tchebysheff's theorem states that regardless of how the data are distributed, at least 75% of the values will be within two standard deviations of the mean and 89% of the values will be within three standard deviations of the mean.

<sup>4</sup> The range is the difference between the largest and smallest value.

- The variance<sup>5</sup> of rates is highest in the 100% urban areas.
- The average price does not vary greatly as a function of the degree of urbanization.
- There is no statistically significant difference in the average price as a function of the percent of the population living in urban areas.
- The average zero and one-hundred percent urban rates are the highest and lowest rates, respectively.

The data can also be represented with a histogram. Again we have 11,252 observations (wire centers) and it illustrates that the prices are closely clustered but for a few exceptions that exceed twenty-seven or less than thirteen dollars per month.

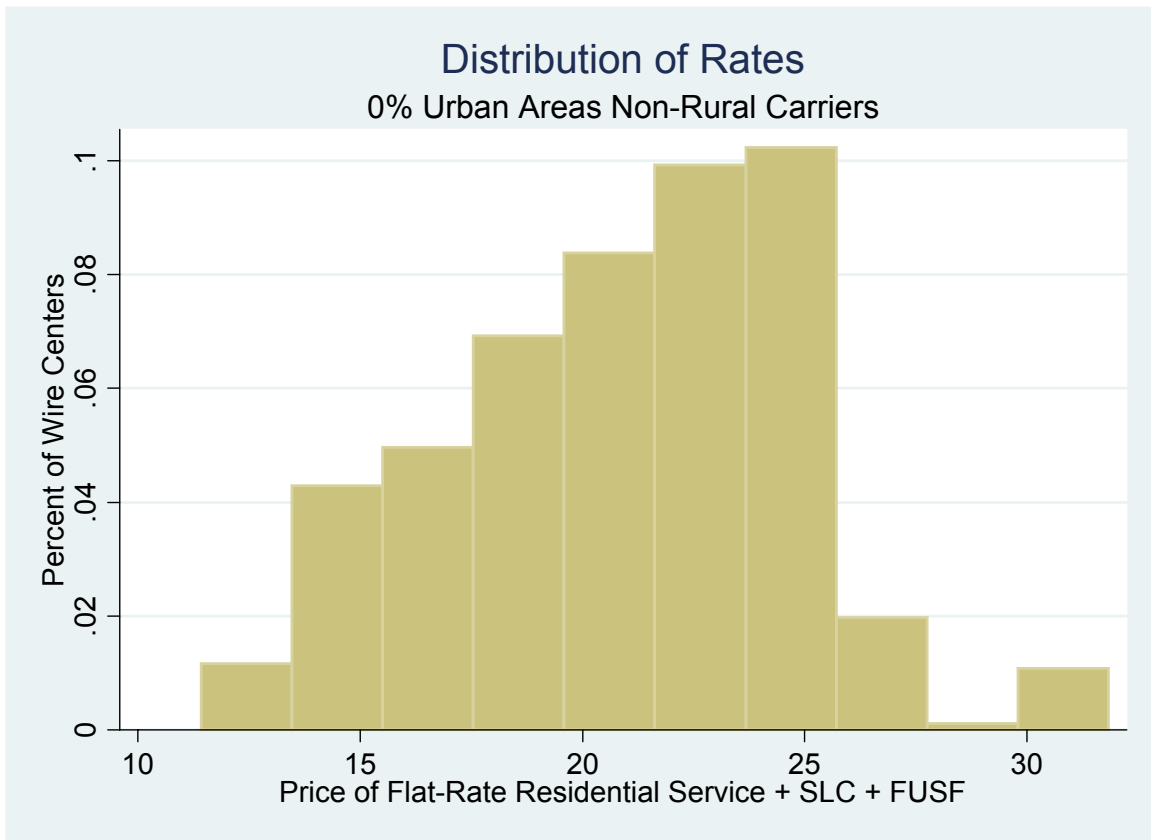


<sup>5</sup> The variance is the square of the standard deviation.

The distribution of prices is different for the 100% urban areas. Here is the same plot for those areas where the percentage of the wire center population living in an urban area is 100%. Here we see a greater spread of rates than exists for the entire sample of non-rural companies.



The next diagram shows the distribution of the price of flat-rate residential exchange service for those wire centers where the percent of the population living in urban areas is zero. This figure looks similar to half of the normal distribution bell-shaped curve. The mode<sup>6</sup> for the distribution is approximately \$25, significantly higher than the \$16 rate in 100% urban areas (see figure 3).



<sup>6</sup> The mode is the most frequently observed observation.

## Description of dataset construction

The dataset presented in this analysis was constructed from a variety of publicly and commercially available sources.

Census data for wire centers was derived by overlaying census 2000 block group boundary maps onto wire center boundary maps.<sup>7</sup> The overlay operation referred to was performed with *Maptitude*, a commercially available mapping and GIS program put out by Caliper Corporation. The overlay operation aggregated the data contained in the block groups up to the wire center level. Block groups spanning wire center boundaries had their data split among the wire centers they spanned based upon algorithms embedded within *Maptitude*.

The percentage Urban Population contained in a wire center was calculated utilizing the census block group data aggregated to the wire center level. The census block group data obtained from Caliper Corporation contained a data field providing a count of the Urban Population residing in a census block group.<sup>8</sup> When the wire center overlay operation was performed this field was summed to the wire center level, along with the Total Population field. The percentage Urban Population contained in a wire center was then calculated by dividing wire center Urban Population by total wire center population and multiplying by 100.

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<sup>7</sup> The block group boundary data and information was taken from data supplied with a commercial mapping/GIS program called *Maptitude* put out by Caliper Corporation, found on the web at [www.caliper.com](http://www.caliper.com). The WC boundary map utilized is also a commercial product from Geographic Data Technology, Inc. (GDT).

<sup>8</sup> For Census 2000, the Census Bureau classifies as “**urban**” all territory, population and housing units contained in Urbanized Areas (UA) and Urban Clusters (UC). UA and UC boundaries are defined as encompassing densely settled territory consisting of:

- **Urbanized Area**—An area consisting of a central place(s) and adjacent territory with a general population density of at least 1,000 people per square mile of land area that together have a minimum residential population of at least 50,000 people. The Census Bureau uses published criteria to determine the qualification and boundaries of UAs.
- **Urban Cluster**—A densely settled territory that has at least 2,500 people but fewer than 50,000. New for Census 2000.

For Census 2000, the Census Bureau classifies as “**rural**” all territory, population, and housing units located outside of UAs and UCs. The rural component contains both place and nonplace territory. Geographic entities, such as census tracts, counties, metropolitan areas, and the territory outside metropolitan areas, often are “split” between urban and rural territory, and the population and housing units they contain often are partly classified as urban and partly classified as rural.

The Census Bureau’s definition(s) of what constitutes Urban and Rural may be found at [http://www.census.gov/geo/www/ua/ua\\_2k.html](http://www.census.gov/geo/www/ua/ua_2k.html).

The following companies are included in the data analysis:

<b>Telephone Company Name</b>	<b>Frequency of Wire Centers</b>	<b>Percent of Wire Centers</b>
ACS OF ANCHORAGE	11	0.1
ALLTEL NEBRASKA	142	1.26
AMERITECH ILLINOIS	16	0.14
AMERITECH INDIANA	173	1.54
AMERITECH MICHIGAN	359	3.19
AMERITECH OHIO	253	2.25
AMERITECH WISCONSIN	118	1.05
BELLSOUTH SO BELL	653	5.8
BELLSOUTH SO CNTL	966	8.59
BELLSOUTH TELECOM-SC	1	0.01
CENTRAL TEL CO NV	21	0.19
CENTURYTEL MO (SW)	1	0.01
CENTURYTEL SVCS GRP	181	1.61
CINCINNATI BELL	57	0.51
FRONTIER ROCHESTER	47	0.42
HAWAIIAN TELECOM-HI	102	0.91
KY ALLTEL LEXINGTON	58	0.52
NEVADA BELL	47	0.42
PACIFIC BELL	704	6.26
QWEST CORPORATION	1,247	11.08
QWEST CORPORATION-CO	1	0.01
QWEST CORPORATION-NM	1	0.01
SO NEW ENGLAND TEL	134	1.19
SOUTHWESTERN BELL	1,351	12.01
SOUTHWESTERN BELL-OK	1	0.01
SUREWEST TELEPHONE	2	0.02
VERIZON CALIF. INC	182	1.62
VERIZON CALIFORNIA	102	0.91
VERIZON DELAWARE INC	32	0.28
VERIZON FLORIDA INC.	99	0.88
VERIZON MARYLAND INC	212	1.88
VERIZON NEW ENGLAND	650	5.78
VERIZON NEW JERSEY	212	1.88
VERIZON NEW YORK INC	479	4.26
VERIZON NORTH - IL	75	0.67
VERIZON NORTH - MI	1	0.01
VERIZON NORTH INC IN	77	0.68
VERIZON NORTH INC.	1,073	9.54
VERIZON NORTH-OH	1	0.01
VERIZON NORTHWEST	167	1.48
VERIZON PENNSYLVANIA	396	3.52
VERIZON SOUTH INC.	50	0.44
VERIZON SOUTH-NC	28	0.25
VERIZON SOUTH-VA	94	0.84



VERIZON SW INC.	216	1.92
VERIZON SW INC.-TX	67	0.6
VERIZON VIRGINIA INC	225	2
VERIZON WASHINGTON	24	0.21
VERIZON WEST VA	143	1.27
<b>Total</b>	<b>11,252</b>	<b>100</b>