Fixed-Mobile Telephone Subscription Substitution in the U.S.

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ABSTRACT: We empirically estimate the substitutability of fixed and mobile services for telecommunications access using a large, U.S. household survey[1] conducted over the period 1999-2001. We take advantage of telephone price subsidy programs for low-income households to identify large, exogenous changes in fixed service prices to find substantial demand substitutability between fixed and mobile subscription. Since income and demographic factors account for the subsidy's effect on subscription to cable TV and Internet services and purchase of a personal computer, we infer that the residual effect of the subsidy on mobile subscription represents a price, and not an income, effect.

KEYWORDS: Telecommunications, Mobile, Substitution, Lifeline

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I. INTRODUCTION

The degree to which mobile telephones substitute for fixed line service is relevant to a policy issues surrounding the appropriate regulation of fixed line services. In the US, the introduction of competition local telephone had been focused primarily on the larger business customers. Residential consumers increasingly have local service options other than the incumbent carrier, but even these are often through lines leased from the incumbent and resold by retailers. At the same time, diffusion of mobile telephone service to households has occurred at a phenomenal pace. Just twenty years after mobile introduction there are more mobile phones than fixed line phones both in the US and globally. While mobile service technically provides an alternative means to place and receive telephone calls, it is differentiated from fixed service in many ways. Initially, this differentiation rendered substitutability negligible. However, as prices have fallen, quality has improved and the technology has become more accepted, most analysts have expected fixed-mobile substitution to increase.

This paper attempts to estimate the magnitude of the substitution between mobile and fixed telephone subscriptions in the US for the 1999-2001 period. We take advantage of the Lifeline program's fixed service price subsidy offered to low income households to promote universal service. Participating households both face lower fixed line prices and subscribe to mobile service at lower rates. Because households are selected for participation in the subsidy program based on income, we develop a method of identifying how much of this is a price effect versus an income effect. This is accomplished by comparing the subscription rates of these households' for other telecommunications related goods and services where we expect an income effect, but not a price effect. Demographic and income variables account for virtually all of the effect from being a Lifeline household for these other goods and services. We infer that the remaining effect for mobile service represents a classical cross-price substitution effect. Using this methodology, we find a fair amount of mobile-fixed substitution.

II. BACKGROUND

Initially, mobile telephone service did not pose an attractive alternative to fixed service. Given its high relative price, cellular service was truly a luxury, not a substitute for fixed line. Cellular technology also lagged significantly in nonprice terms: transmission quality and geographic coverage were poor by fixed-line standards; early cell phones were cumbersome and not the portable devices that are commonplace today. These differences resulted in cellular's limited penetration rates when first introduced in the 1980s. Mobile service adoption has grown at astonishing rates as access and usage fees continue to plummet and the quality of the service and the performance of mobile providers steadily improve.

The diffusion of mobile services comes at a time when telecommunications authorities and the public are concerned over the lack of speed in the development of competition in local services. At the same time, mergers between mobile carriers raise more concern if consumers do not consider fixed line service to be a viable alternative for mobile calls. Unbundling and resale of network services to facilitate entry has not produced the competition originally envisioned by legislation such as the 1996 Telecommunications Act in the U.S. Nor have competitive carriers overbuilt incumbent networks to any great extent. While large business customers in dense city centers may be able to choose between providers, most smaller businesses and residents have few facilities-based options available. The slower-than-anticipated pace at which fixed-line incumbents have relinquished market share to competitors leaves mobile services as their most immediate and potent competition.

The promise of fixed-mobile competition turns, in part, on whether, under prevailing market demand and cost conditions, mobile alternatives prevent fixed-line carriers from exercising market power. As costs of mobile telephony continue to drop, allowing prices to fall and quality to rise, mobile becomes an increasingly attractive alternative to fixed-line service. Technically, mobile is a substitute because users can place and receive voice calls just as they do with fixed service.

So far, the incidence of users who forgo fixed service entirely and depend completely on mobile, are few in number. The profile of the typical wireless-only user is young and single. In its last two annual reports on the wireless industry, the FCC concluded from its review of third-party research that about 3% of U.S. users rely on mobile as their only phone service, while about 12% reported that they purchased mobile service rather than adding a supplementary fixed line.[2] A recent report on residential penetration of fixed and mobile telephone showed mobile-only households falling between 6% and 8% of UK households throughout the 2000-2004 period.[3]

As part of the universal service funding program, the federal government in cooperation with the states, defrays the cost of telephone service for the neediest households. Lifeline Assistance ("Lifeline") is the principal subsidy program for residential phone users. It provides for a reduction in the monthly telephone bill of between $6.75 and $14.78 depending on the

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[2] See FCC (2003, 2004)

[3] See Figure 20 in Ofcom (2004). These estimates are consistent with a quarterly series of market research studies that were conducted by Oftel over the prior several years. See, e.g., Oftel (2003).

state.[4] While the subsidies are available for *both* fixed line and mobile phone service, during our sample, they have gone almost exclusively to wireline carriers. For example, the percentage going to wireless carriers was 0.5% in 2001, 1.5% in 2002 and 3.9% in 2003 (CTIA, 2004). The carrier is permitted to require recipients to accept the blocking of toll calls. The USF also administers Link-Up America program which pays for as much as 50% of phone installation charges up to $30 for eligible households. Given the small size of the Link-Up subsidy, we will concentrate on the price effects of the Lifeline program.

Eligibility for the Lifeline subsidy depends on whether the household falls below some income threshold which is expressed as a percentage of the Federal Poverty Guideline and/or whether it participates in an income-based assistance program (e.g., Medicaid, food stamps, SSI). Income threshold varies across the states, and depends on family size. It can be a low as $12,000 for a one-person household and as much as $42,000 for a household of eight, plus $4,293 for each additional household member.

Table 1 summarizes the Lifeline subsidy across states and the District of Colombia, plus the eligibility requirements. Notice the wide variability in the estimated rates of participation in this program. The specific state specification of the subsidy and eligibility conditions explains some of this variability, but most likely just a small percentage. Consumer awareness may also vary across states as publicity of the availability of Lifeline program is the responsibility of each local telephone carrier.

The academic literature containing empirical analyses of the demand for mobile

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[4] The subsidy for residential users on tribal lands can receive substantially larger monthly subsidies. A household that is receiving Lifeline Assistance cannot be charged a fee for porting their number to a new carrier.

communications is primarily limited to analyses of subscription rates. Most of the contributions rely on data aggregated to the metropolitan or country level. Hausman (1999, 2000) estimates the elasticity of aggregate subscription to cellular service in the 30 largest U.S. markets over the period 1988-1993. Ahn and Lee (1999) estimate demand for mobile access in Korea using more recent wireless subscription data for 64 countries. Only recently has research appeared that examines fixed-mobile substitution. Sung, Kim and Lee (2000) find that the number of Korean mobile subscribers is positively correlated with the number of fixed-line disconnects, but negatively related to the number of new fixed-line connections, suggesting net substitution between the two services. This pattern occurs even while the stock of fixed lines is positively correlated with the number of mobile subscribers, offering evidence that the two services are complements.[5] Recently, Rodini, Ward and Woroch (2003) found only modest substitution between mobile subscription and the demand for second-lines using the same U.S. dataset that is analyzed in the present paper. Turning to an examination of usage demand, Ward and Woroch (2004) found some degree of substitution between fixed and mobile, especially for long distance calls. Ahn, Lee and Kim (2004) do the same for the Korean market.

III. DATA

The main source of data in our analysis are the Bill Harvesting data from TNS Telecoms ReQuest Market Monitor® along with its survey responses.[6] This quarterly sample of U.S. household consumption of various telecommunications services is derived from a large national panel. Participating households are asked to submit one set each of their original bills for local,

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[5] Ahn and Lee (1999) also find evidence of complementarity also using aggregate data.

[6] See <www.tnstelecoms.com>.

long distance, cellular, cable TV and Internet services. Besides summary information, the data set extracts detailed call information from each "harvested" phone bill. While these data were first collected in 1995, this paper uses data from the ten-quarter period July 1999 - December 2001 during which a uniform sampling method and survey instrument were employed. While constructed from a subset of a panel, the Bill Harvesting data do not themselves constitute a panel[7]. Finally, household demographic information was also collected as well as responses to survey questions from the entire household panel, including those household who submitted their monthly bills.

Table 2 provides overall summary statistics for the ReQuest data. About 77,000 households submitted telephone bill information, of which, slightly more than 6,000, or 8%, receive some form of Lifeline support. The fraction of households subscribing to mobile telephone service has increased steadily for both the Non-lifeline and Lifeline households. Across all quarters, the subscription rate is about 20% higher for non-Lifeline households.

Table 3 indicates that Lifeline households are predominately low-income households. About 20% of households with income under \$15,000 per year receive Lifeline service while only 4% of households with income over \$15,000 per year receive Lifeline service. About 60% of all Lifeline households have income under \$15,000 per year. These data indicate two anomalies. First, over three-quarters of households with income under \$15,000 per year do not receive Lifeline assistance. Second, Lifeline service is received by some households in all income categories, even the highest. It appears that the program does not reach all the poor, but does reach many who are decidedly not poor. It may be possible for a qualifying household to

[7]About a quarter of all survey respondents actually submitted their phone bills, and of these households, about 10% were re-sampled during the 2000-2001 period.

have a change of fortune later in their lifetimes but retain the subsidy.[8] It could also represent misreporting due to respondents' unwillingness to reveal their actual income.[9] It is worth noting that a redistribution of Lifeline assistance away from households with income over $15,000 per year and toward households with income under $15,000 per year would increase the fraction of these poorer households with assistance only to about one-third receiving assistance.

Tables 4 through 8 report the rate Lifeline assistance by household composition, size, children in the home, marital status and race. For each of the tables, the Chi-Square test indicates that we reject the hypothesis of equal treatment across cells. A number of general conclusions follow. First, Lifeline support is more common among those living alone or living without a spouse, especially for women. Second, Lifeline support is more common among the smallest and largest households sizes. Third, Lifeline support appears to be more common when young children are present. Forth, Lifeline support is more common when householders are not married. Fifth, Lifeline support is more common in non-white households. In general, while income seems to be a highly related to Lifeline support, these other demographic factors also appear to contribute to a household receiving support.

IV. METHODOLOGY AND RESULTS

The outline of our methodology is as follows. Households with lifeline support both face lower prices for fixed line service and they tend to have lower incomes. Even after controlling

[8]Anecdotal evidence indicates that some may qualify as college students before beginning professional careers.

[9]Some internal checks indicate that other demographic variables present no obvious inconsistencies with these households' higher reported incomes.

for income and demographic differences, these households tend to subscribe to mobile telephone service less often. They could subscribe to mobile service less often because of either a cross-elastic effect from lower fixed service prices or from an income effect. We identify the price effect from the income effect indirectly by examining these households' likelihood of owning a computer, and subscribing to cable television service or Internet service. So long as differences across households in cable TV and Internet prices are small, a lower likelihood of purchasing these services is likely to be due to their lower income and not a substitution effect. We show that controlling for income and demographic characteristics virtually eliminates any differential in demand between households with and without lifeline support. This suggests that controlling for income and demographic characteristics in estimates of mobile demand will likewise eliminate any residual income effect. We therefore ascribe any remaining effect of lifeline on mobile demand as a cross-price access substitution effect.

We first document the magnitude of the effect that Lifeline assistance has on local telephone bills. Different states implement Lifeline assistance in different ways. We estimate the average effect of Lifeline assistance by regressing the value of a households local telephone bill, or its logarithm, against a dummy variable for Lifeline assistance and quarterly dummy variables that could capture a trend in prices. Table 9 indicates that Lifeline assistance lowers a household's monthly bill from about $33 to about $22 in the first quarter. At the sample mean, this indicates that Lifeline customers' bills are 32% lower (from the linear model) or 41% lower (from the logarithmic model).

Next, we estimate the effect of Lifeline subsidy on the probability of subscribing to mobile telephone service.[10] Table 10 reports the results from probit regressions. Rather than report the coefficient, we report the marginal effect of Lifeline on the probability of subscribing. Also, we do not report the individual coefficient estimates for each of the 100 categorical variables, but instead indicate whether they are jointly significant at the 1% level for a particular demographic measure. Because mobile subscription rates have increased dramatically over time we include year and quarter dummies. Similarly, because lifeline participation rates differ considerably across states, we include state specific dummy variables. The main result here is that Lifeline customers are estimated to be 17.8% less likely to subscribe to mobile service, however, once income and demographic variables are accounted for the Lifeline effect falls to 3.1%. This residual Lifeline effect is still statistically significantly different from zero.

At this point, we are unsure as to whether the remaining Lifeline effect is a pure price effect or if it includes some residual, unmeasured income effect. To address this concern, we examine the effect of Lifeline assistance on consumers' other telecommunications related decisions. In particular, we have information on whether the household has a personal computer, subscribes to cable television service or subscribes to an Internet service provider. There is no reason to suspect a non-negligible cross-elastic effect from lower telephone prices to these other demand decisions (e.g., no income effect). However, since Lifeline households tend to be poorer, and these are considered normal goods, we would expect Lifeline customers to choose these products and services less often for purely income related reasons.

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[10]One complication is the treatment of prepaid mobile service. Prepaid service has not been as popular in the US as in other developed countries but has been relatively more popular with lower income households. Our data asks if the respondent "has cellular or PCS service." If households using prepaid consider "service" to mean subscription service and therefore answer no, we may be underestimating the substitution. However, this is likely to be a small effect.

Table 11 reports probit regression results for each of computer ownership, subscription to cable television service and subscription to an Internet service provider. As above, we report the marginal effect of Lifeline on the probability of subscribing rather than the underlying coefficient and suppress the individual coefficient estimates for the other categorical variables. It comes as no surprise that Lifeline customers are 6%, 17% and 16% less likely to choose these three products and services, respectively. However, for each of the three, we find virtually no remaining effect of Lifeline after controlling for income and demographic differences.

We infer from these results that, for these three choices, the income and demographic variables adequately capture, all, or nearly all, of the income effect expected from Lifeline households. This suggests that these income and demographic variables would also adequately capture the income effect expected from Lifeline households for the mobile telephone service decision. If so, we can conclude that the 17.8% lower probability of subscribing to mobile service by Lifeline households can be decomposed into a 14.7% income effect and a 3.1% cross-elastic price effect.

The remaining Lifeline effect on mobile service, that we identify as a price effect, can be expressed as an elasticity. Since about 36.5% of all households in the sample subscribe to mobile telephone service, the 3.1% cross-price effect represents a 8.5% reduction in the number of subscribers. Since local bills are 32% to 41% lower for Lifeline households, this represents a cross-elasticity of 0.21 or 0.27.[11] While not extremely large, this indicates a non-negligible substitution between fixed and mobile telephone services, at least for households receiving

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[11] These estimates are somewhat larger than the statistically-significant cross-price elasticity estimates of 0.18 and 0.13 that was found for second-phone lines in Rodini, Ward and Woroch (2003) for years 2000 and 2001, respectively.

Lifeline assistance.

Our data do not include a similar natural experiment with which to estimate the cross-elastic effect from mobile price changes on the decision to subscribe to fixed line service. However, demand theory provides a possible way to make inferences about other demand parameters.[12] The Slutsky symmetry condition implies that the cross-elasticity from fixed price changes to mobile subscription is very likely to take on the same sign as the effect from mobile price changes to fixed telephone service. Specifically, for small changes in real income, budget-share weighted cross-price elasticities should be nearly equal:

$$\mathrm{w}_{\mathrm{f}}\ \eta_{\mathrm{fm}} \approx \mathrm{w}_{\mathrm{m}}\ \eta_{\mathrm{mf}}$$

where w_{f} and w_{m} are budget shares for fixed and mobile services, respectively, and $_{\mathrm{fm}}$ and $_{\mathrm{mf}}$ are the corresponding cross-price elasticities. During our sample, the average household expenditure for mobile service was about half that for fixed line service, implying that the cross-elasticity from mobile prices to fixed line demand would be 0.10-0.14.[13] Note that the applicability of the above condition may be hindered by complex two-part pricing schemes.

Application of the homogeneity of degree one condition, $_{\mathrm{j}}\ _{\mathrm{ij}} =\ _{\mathrm{i}}$, can yield further implications for own-price elasticities. Estimates of income elasticities for fixed and mobile service are about 0.1 and 0.5 respectively.[14] If the net effect of all other cross-elasticities is negligible, these estimates imply own-price elasticities of about -0.2 for fixed service and about -0.7 to -0.8 for mobile service. This estimate range for fixed-service is decidedly more elastic than

[12]See Deaton and Muelbauer (1980).

[13]This is slightly less elastic that was found for second phone lines using the same data but a different estimator (Rodini, Ward and Woroch, 2003).

[14]Cite to literature needed.

is usually found in the literature.[15] However, traditional studies do not usually take into account prices of substitutes. Moreover, most of the variation in these studies is across geographic markets where the cost differences would likely affect of all forms of access. Note that with the above estimates, a one percent increase in the prices of both fixed and mobile service simultaneously implies a 0.1% and 0.5% reduction in fixed and mobile subscriptions respectively, more in keeping with the traditional estimates. Therefore, our estimate inferences from demand theory can be reconciled with the existing literature.

One question remaining is whether this result generalizes to the non-Lifeline population. That is, consumers receiving Lifeline assistance tend both to have revealed themselves be willing to seek out an assistance program and to be poorer. In either case, they may be more sensitive to price differences than the general population. We cannot address the magnitude of the first issue. However, we attempt to address the second issue by comparing results for lower-income Lifeline customers with those for higher-income Lifeline customers. We divided the sample into households with income below $25,000 per year and those with income above. About one-third of the Lifeline households are in this higher income group.

Table 12 reports results for local telephone bills and for mobile subscription for the two samples. The Lifeline assistance amount appears to be considerably smaller in the high income group. For the low income group, this represents a 33% to 42% price reduction. For the higher income group, it represents a 19% to 24% price reduction. In both groups, there is a significant reduction in the probability of subscribing to mobile service by Lifeline households. Because only 17.5% of the low income group subscribes to mobile service, the 2.56% reduction in the

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[15] See the survey of elasticity estimates in Taylor (1994).

probability represents a 14.6% percent change. Likewise, 49.5% of the high income group subscribes to mobile service, making the 3.43% lower probability of subscribing a 6.9% reduction. This results in an elasticity estimate of 0.35-0.44 for the low income group and 0.29-0.36 for the high income group. As expected, the lower income group is somewhat more price elastic. Still, the higher income group displays a fair degree of substitutability. The range for the low income group is not significantly different from that obtained for the combined sample. It does not appear that the Lifeline households' lower income is the significantly biasing substitution effects upward.

V. CONCLUSION

Recent telecommunications regulation policy can be characterized as greater reliance on competitive forces. In the US, this has led to the deregulation of customer premises equipment (telephones), long distance, and business services and an on-again/off-again regulatory treatment of cable TV service. New services, such as mobile and Internet, have largely avoided price regulation. However, local fixed telephone service is one of the few large telecommunications areas in which direct price regulation remains common. This could be due to the lack of workably competitive alternatives for most customers.[16]

Mobile phones show promise as a local phone alternative that is both widely available and already has multiple competitors. Mobile phones have become highly popular due, no doubt, to improvements in handsets, coverage, quality-of-service, and price. At the same time, for the first time in generations, the number of fixed line phones in the US has fallen from one year to

[16]It remains to be seen if regulators would actually cede this last foothold that remaining in telecommunications.

the next and has done so for the past few years. If these trends continue over another twenty years, the fixed line phone may become as quaint as the switchboard operator. In the mean time, substitution between the two can not be assumed but must be documented. This paper indicates that some degree of subscription substitution began to occur in the US as of 2001.

Table 1: Lifeline Assistance Subsidy Programs by State, 2000

State	State & Federal Subsidy	Income Eligibility as % of FPGs	No. of Eligible HHs	No. of Lifeline Participants	Participation Rate	State & Federal Funding	Avg. Subsidy Per Participant
Alabama	$12.00	100%	276,933	21,493	7.80%	$2,793,236	$129.96
Alaska	$12.00	140%	30,999	9,291	30.00%	$974,908	$104.93
Arizona	$6.75	125%	304,879	25,283	8.30%	$1,930,052	$76.34
Arkansas	$6.75	110%	201,086	9,228	4.60%	$586,944	$63.60
California	$12.00	150%	2,680,846	3,196,657	119.20%	$410,195,083	$128.32
Colorado	$12.00			26,645		$3,478,346	$130.54
Connecticut	$8.50	150%	201,177	64,745	32.20%	$5,761,964	$88.99
Delaware	$6.75	150%	49,649	756	1.50%	$51,668	$68.34
D.C.	$14.78	150%	55,754	11,236	20.20%	$1,798,855	$160.10
Florida	$12.00	125%	997,296	134,281	13.50%	$17,484,593	$130.21
Georgia	$12.00	130%	508,390	73,037	14.40%	$9,458,967	$129.51
Hawaii	$6.75	150%	77,478	15,381	19.90%	$1,058,126	$68.79
Idaho	$12.00	133%	90,561	19,696	21.70%	$2,594,828	$131.74
Illinois	$10.85	125%	643,489	57,816	9.00%	$5,457,734	$94.40
Indiana	$6.75	125%	304,991	21,363	7.00%	$1,513,003	$70.82
Iowa	$6.75	150%	207,286	11,862	5.70%	$723,345	$60.98
Kansas	$12.00	130%	176,231	8,564	4.90%	$1,128,718	$131.80
Kentucky	$12.00	110%	253,387	39,560	15.60%	$5,107,687	$129.11
Louisiana	$6.75	150%	491,906	15,476	3.10%	$1,051,428	$67.94
Maine	$12.00	130%	76,981	76,367	99.20%	$9,937,523	$130.13
Maryland	$12.00	150%	296,725	3,948	1.30%	$517,576	$131.10
Massachusetts	$14.50	175%	582,411	165,519	28.40%	$26,642,487	$160.96
Michigan	$9.75	150%	704,314	141,541	20.10%	$14,709,039	$103.92
Minnesota	$6.75	150%	275,082	56,977	20.70%	$3,681,452	$64.61
Mississippi	$12.00	130%	266,829	16,694	6.30%	$2,171,534	$130.08
Missouri	$6.75	110%	247,448	18,982	7.70%	$1,426,495	$75.15
Montana	$12.00	100%	53,062	11,125	21.00%	$1,331,928	$119.72
Nebraska	$12.00	130%	106,976	14,462	13.50%	$1,781,030	$123.15
Nevada	$12.00	150%	118,191	17,486	14.80%	$2,038,508	$116.58
New Hampshire	$6.75	160%	75,934	6,453	8.50%	$439,221	$68.06
New Jersey	$6.75	150%	494,310	29,095	5.90%	$2,025,566	$69.62
New Mexico	$13.00	*150%*	198,108	36,863	18.60%	$5,014,156	$136.02
New York	$10.74	150%	1,694,424	586,660	34.60%	$67,978,335	$115.87
North Carolina	$12.00	110%	450,240	62,507	13.90%	$8,227,414	$131.62
North Dakota	$12.00	150%	62,908	13,440	21.40%	$1,541,839	$114.72
Ohio	$6.75	150%	841,049	167,213	19.90%	$12,843,158	$76.81
Oklahoma	$8.50	130%	275.079	17,768	6.50%	$1,052,934	$59.26
Oregon	$12.00	135%	238,897	30,374	12.70%	$3,983,208	$131.14
Pennsylvania	$10.50	150%	892,494	48,975	5.50%	$5,432,267	$110.92
Rhode Island	$12.00	175%	98,655	47,412	48.10%	$6,146,304	$129.64
South Carolina	$12.00	130%	299,014	20,820	7.00%	$2,618,912	$125.79
South Dakota	$6.75	140%	50,895	13,442	26.40%	$859,215	$63.92
Tennessee	$12.00	125%	403,622	38,884	9.60%	$4,977,074	$128.00
Texas	$12.00	125%	1,391,764	258,812	18.60%	$31,365,245	$121.19
Utah	$12.00	130%	94,787	19,394	20.50%	$2,477,410	$127.74
Vermont	$12.00	150%	49,537	29,740	60.00%	$3,945,378	$132.66
Virginia	$12.00	130%	369,775	21,658	5.90%	$2,816,573	$130.05
Washington	$12.00	130%	307,895	68,143	22.10%	$8,809,939	$129.29
West Virginia	$9.75	110%	142,712	5,294	3.70%	$517,535	$97.76
Wisconsin	$8.50	150%	320,548	62,798	19.60%	$5,591,482	$89.04
Wyoming	$13.50	150%	40,015	1,363	3.40%	$200,967	$147.44
TOTALS			18,798,215	5,872,579	31.24%	$716,251,189	$121.97

Table 2
Summary Statistics

	Non-Lifeline		Lifeline	
Quarter	Number of Households	Percent Mobile Subscribers	Number of Households	Percent Mobile Subscribers
1999:3	7,393	29.4%	458	11.8%
1999:4	6,479	30.8%	379	14.8%
2000:1	7,553	34.2%	454	16.3%
2000:2	7,375	35.4%	518	12.7%
2000:3	8,739	36.2%	573	18.3%
2000:4	6,560	39.1%	463	18.8%
2001:1	6,449	41.9%	821	28.5%
2001:2	6,527	43.0%	837	29.5%
2001:3	6,669	43.2%	930	29.9%
2001:4	7,226	41.7%	721	23.2%

Table 3
Distribution of Lifeline Households by Income Category

Income Category	Non-Lifeline	Lifeline	Total
Under $7,500	3,043	1,290	4,333
	70.23%	29.77%	100.00%
$7,500 - $9,999	3,259	956	4,215
	77.32%	22.68%	100 00%
$10,000 - $12,499	4,277	798	5,075
	84.28%	15.72%	100 00%
$12,500 - $14,999	3,912	531	4,443
	88.05%	11.95%	100 00%
$15,000 - $19,999	5,935	585	6,520
	91.03%	8.97%	100 00%
$20,000 - $24,999	7,185	494	7,679
	93.57%	6.43%	100 00%
$25,000 - $29,999	5,493	297	5,790
	94.87%	5.13%	100 00%
$30,000 - $34,999	5,204	232	5,436
	95.73%	4.27%	100 00%
$35,000 - $39,999	4,495	194	4,689
	95.86%	4.14%	100 00%
$40,000 - $44,999	3,921	159	4,080
	96.10%	3.90%	100 00%
$45,000 - $49,999	3,258	104	3,362
	96.91%	3.09%	100 00%
$50,000 - $59,999	5,581	149	5,730
	97.40%	2.60%	100 00%
$60,000 - $69,999	3,616	95	3,711
	97.44%	2.56%	100 00%
$70,000 - $74,999	2,175	62	2,237
	97.23%	2.77%	100 00%
$75,000 - $99,999	5,518	118	5,636
	97.91%	2.09%	100 00%
$100,000 or over	4,098	90	4,188
	97.85%	2.15%	100 00%
Total	70,970	6,154	77,124
	92.02%	7.98%	100 00%

Table 4
Distribution of Lifeline Households by Household Composition

	Non-Lifeline	Lifeline	Total
Male and female married	35,913	1,694	37,607
	95.50%	4.50%	100.00%
Female head living with others related	6,482	977	7,459
	86.90%	13.10%	100.00%
Male head living with others related	2,284	184	2,468
	92.54%	7.46%	100.00%
Female alone	15,109	2,004	17,113
	88.29%	11.71%	100.00%
Female living with others not related	1,585	172	1,757
	90.21%	9.79%	100.00%
Male alone	8,499	1,027	9,526
	89.22%	10.78%	100.00%
Male living with others not related	1,098	96	1,194
	91.96%	8.04%	100.00%
Total	70,970	6,154	77,124
	92.02%	7.98%	100.00%

Table 5
Distribution of Lifeline Households by Household Size

	Non-Lifeline	Lifeline	Total
Single member	23,608	3,031	26,639
	88.62%	11.38%	100.00%
Two members	25,240	1,451	26,691
	94.56%	5.44%	100 00%
Three members	9,623	747	10,370
	92.80%	7.20%	100 00%
Four members	7,459	470	7,929
	94.07%	5.93%	100 00%
Five or more members	5,040	455	5,495
	91.72%	8.28%	100 00%
Total	70,970	6,154	77,124
	92.02%	7.98%	100 00%

Table 6
Distribution of Lifeline Households by Children in the Home

	Non-Lifeline	Lifeline	Total
Under 6 only	4,081	364	4,445
	91.81%	8.19%	100.00%
Age 6 - 12 only	3,982	330	4,312
	92.35%	7.65%	100.00%
Age 13 - 17 only	4,390	293	4,683
	93.74%	6.26%	100.00%
Under 6 and age 6 - 12	2,437	242	2,679
	90.97%	9.03%	100.00%
Under 6 and age 13 - 17	400	49	449
	89.09%	10.91%	100.00%
Age 6 - 12 and age 13 - 17	2,528	193	2,721
	92.91%	7.09%	100.00%
All 3 age groups	463	62	525
	88.19%	11.81%	100.00%
No children under 18	52,689	4,621	57,310
	91.94%	8.06%	100.00%
Total	70,970	6,154	77,124
	92.02%	7.98%	100.00%

Table 7
Distribution of Lifeline Households by Marital Status

	Non-Lifeline	Lifeline	Total
Married	37,203	1,793	38,996
	95.40%	4.60%	100.00%
Widowed	10,763	1,269	12,032
	89.45%	10.55%	100.00%
Divorced/Separated	11,448	1,685	13,133
	87.17%	12.83%	100.00%
Single	11,384	1,383	12,767
	89.17%	10.83%	100.00%
Unknown	172	24	196
	87.76%	12.24%	100.00%
Total	70,970	6,154	77,124
	92.02%	7.98%	100.00%

Table 8
Distribution of Lifeline Households by Race

	Non-Lifeline	Lifeline	Total
White	64,485	5,233	69,718
	92.49%	7.51%	100.00%
Black / African - American	3,326	375	3,701
	89.87%	10.13%	100.00%
Asian or Pacific Islander	627	77	704
	89.06%	10.94%	100.00%
Other	1,210	262	1,472
	82.20%	17.80%	100.00%
Unknown	1,322	207	1,529
	86.46%	13.54%	100.00%
Total	70,970	6,154	77,124
	92.02%	7.98%	100.00%

Table 9
The Effect of Lifeline Support on Monthly Telephone Bill

	Local Bill	Log Local Bill
Constant	33.01*	3.3704*
	(0.23)	(0.0057)
Lifeline	-11.10*	-0.5318*
	(0.27)	(0.0068)
1999:4	-0.47	-0.0184
	(0.33)	(0.0084)
2000:1	-0.01	-0.0046
	(0.32)	(0.0081)
2000:2	0.80*	0.0145
	(0.32)	(0.0081)
2000:3	1.82*	0.0564*
	(0.31)	(0.0078)
2000:4	2.13*	0.0646*
	(0.33)	(0.0083)
2001:1	1.96*	0.0730*
	(0.32)	(0.0083)
2001:2	2.30*	0.0790*
	(0.32)	(0.0082)
2001:3	3.74*	0.1252*
	(0.32)	(0.0082)
2001:4	2.75*	0.0905*
	(0.32)	(0.0081)
Observations	78,601	78,599
R^2	0.024	0.076

Table 10
The Effect of Lifeline Support on Likelihood of Subscribing to Mobile Service

	Mobile	Mobile
Lifeline	-0.1786*	-0.0309*
	(0.0056)	(0.0079)
Time Period	Sign.	Sign.
State	Sign.	Sign.
Income		Sign.
Age		Sign.
HH Composition		Sign.
HH Size		Sign.
Children		Sign.
Moved Recently		Sign.
Married		Sign.
Race		Sign.
Hispanic		Sign.
Observations	77,124	73,379
Pseudo R^2	0.0221	0.1592
Log L	-49,331.1	-40,482.5

Table 11
The Effect of Lifeline Support on Demand for Cable TV, Computers & Internet Service

	CATV	CATV	Computer	Computer	Internet	Internet
Lifeline	-0.0676*	0.0006	-0.1654*	-0.0054	-0.1553*	-0.0092
	(0.0067)	(0.0071)	(0.0064)	(0.0079)	(0.0060)	(0.0081)
Time Period	Sign.	Sign.	Sign.	Sign.	Sign.	Sign.
Income		Sign.		Sign.		Sign.
Age		Sign.		Sign.		Sign.
HH Composition		Sign.		Sign.		Not Sign.
HH Size		Sign.		Sign.		Not Sign.
Children		Not Sign.		Sign.		Sign.
Moved Recently		Sign.		Not Sign.		Sign.
Married		Not Sign.		Sign.		Sign.
Race		Sign.		Sign.		Sign.
Hispanic		Not Sign.		Not Sign.		Not Sign.
Observations	77,680	73,906	77,124	73,379	71,990	68,807
Pseudo R^2	0.0016	0.0198	0.0117	0.2026	0.0129	0.1722
Log L	-53,366	-49,813.2	-52,832	-40,554.1	-40,745.5	-38,086.7

Table 12
The Effect of Lifeline Support by Income

	Income under $25,000			Income over $25,000		
	Local Bill	Log Local Bill	Mobile	Local Bill	Log Local Bill	Mobile
Lifeline	-9.98*	-0.5382*	-0.0277*	-6.61	-0.2805*	-0.0344*
	(0.29)	(0.0084)	(0.0067)	(0.55)	(0.0127)	(0.0145)
Time Period	Sign.	Sign.	Sign.	Sign.	Sign.	Sign.
State			Sign.			Sign.
Income			Sign.			Sign.
Age			Sign.			Sign.
HH Composition			Sign.			Sign.
HH Size			Not Sign.			Not Sign.
Children			Sign.			Sign.
Moved Recently			Sign.			Sign.
Married			Sign.			Sign.
Race			Sign.			Sign.
Hispanic			Sign.			Sign.
Constant	29.99*	3.2878*		35.09*	3.4282*	
	(0.31)	(0.0091)		(0.31)	(0.0072)	
Observations	32,437	32,437	30,363	46,164	46,162	43,016
Pseudo R^2	0.038	0.114	0.071	0.005	0.015	0.088
Log L			-13,155.3			-27,205.8

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