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Whose call is it? Targeting universal service programs to low-income households' telecommunications preferences

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ABSTRACT

Do universal service programs give customers what they want? This paper uses new survey data to study low-income households' telecommunications choices in the United States and to consider the degree to which such households' preferences are addressed by existing universal service programs. The research shows that households that choose only one form of telecommunications increasingly are choosing a mobile phone, while those that choose to have both modes of communications are shifting their usage towards their mobile phones. These trends are less pronounced among higher-income households. One implication for universal service policy is that traditional subsidies for landline phones are increasingly ineffective in reaching low-income households such subsidies are designed to help; subsidies for acquiring and using mobile phone services might be more beneficial to low-income households than traditional subsidies for landline phones.

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1. Introduction

Households' choices of telecommunications services have changed dramatically throughout the world during the past decade, and these choices continue to evolve with technology and regulatory involvement. This evolution of telecommunications modes and preferences creates challenges for traditional universal service programs that have to date targeted specific services (for example landline telecommunications) and types of customers (e.g., rural and low-income households). A failure to account for technological advances and changing consumer preferences may result in ineffective and inefficient regulatory policy, as is evidenced by the Lifeline program in the US.

The Lifeline program provides discounts on basic telephone service for low-income households. Through a funding mechanism overseen by the Federal Communications Commission (FCC) and administered by the Universal Service Administrative Company, telecommunications operators providing Lifeline service are reimbursed for the federal portion of the price discounts they provide to low-income households.¹ Although providers of mobile services can obtain regulatory approval to provide Lifeline and receive reimbursement, landline services and service providers dominate the program.²

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¹ A basic level of federal funding for Lifeline is provided for all states. States may receive additional federal support if they elect to provide matching support either through state universal service funds or state assessments against eligible telecommunications carriers ("ETCs"). In Florida, each ETC provides its own matching support (see Holt & Jamison, 2007, for additional details).

² There appear to be three reasons why landline services dominate the Lifeline program. One reason is landline providers were part of the Lifeline program long before wireless providers were allowed to participate. Prior to the 1996 Telecommunications Act, incumbent landline providers in all states that participated in the Lifeline program were Lifeline providers. The 1996 Telecommunications Act changed this policy by mandating that all states participate in the Lifeline program and that all carriers designated as ETCs are required to offer Lifeline price discounts and receive reimbursement. The

This paper examines low-income households' preferences for communications services and asserts that these preferences are significant in influencing the value of household participation and households' participation decisions with respect to Lifeline. The Lifeline program largely continues to favor traditional landline phone service for subsidies even though, according to the evidence presented in this paper, the low-income households that the program is intended to benefit are finding landline service to be increasingly less satisfactory in meeting their telecommunications needs.

Knowing whether low-income households' preferences (as expressed in demand for telecommunications services) are changing and, if so, how, is crucial for meeting the current goals of the universal service program as well as for accurately assessing extensions of the current universal service program, perhaps to broadband. Therefore, this paper seeks to inform the discussion of low-income households' telecommunications choices by addressing two fundamental questions, namely: (1) What communications services are low-income households and consumers purchasing and/or using? (2) How does low-income household use of wireless communications impact enrollment in Lifeline?

Through surveys of citizens in Florida, this study finds that low-income households are more likely than higher-income households to forgo landline service and to depend increasingly on mobile phones for their telecommunications. More specifically, mobile phones are reportedly becoming more essential than landline phones for low-income consumers. Furthermore, this research shows a growing trend that those who subscribe only to one form of communication (landline or mobile phone) are increasingly choosing a mobile phone. This shift from landline to mobile phones is consistent with global trends, and is spurred by new competitive options such as the growth of prepaid mobile phone plans. For example, in 2006 the global mobile telecommunications penetration rate was approximately 40 percent, ranging from 100 percent in many Western countries to less than 10 percent in some Asian and African countries (GSM Association, 2006, p. 1). Mobile service now is viewed by some as the favored method of establishing universal access and eventually universal service worldwide. Mirroring the global trend towards mobile telecommunications, this survey shows a significant shift towards mobile telephone usage among low-income households. Interestingly, US universal service policy has not changed to reflect the rise in mobile penetration. This may be a result of having reached near universal service in the US, while in developing countries this goal is less feasible in the immediate future. Within the US, this trend towards mobile telecommunications appears to be a leading cause of low participation rates in Lifeline because the program is offered primarily by landline telephone providers.

The remainder of this paper is organized as follows. Section 2 provides background on the Lifeline program. Section 3 presents a review of the literature with respect to participation in social programs generally, and more specifically, participation in Lifeline. Section 4 describes the data collection process and methodology of the surveys that provided the data. Section 5 provides results of the statistical and empirical analyses of the data. Finally, Section 6 presents a summary of the findings with policy implications and concludes.

2. Background

The Lifeline program is one of several universal service programs in the US. Created in 1984 by the FCC, upon recommendation of the Federal–State Joint Board,³ a primary motive for developing the Lifeline program was a belief that the introduction of Subscriber Line Charges⁴ following the breakup of AT&T would make basic local telephone service, provided by traditional landline telephone companies, unaffordable for low-income households. This belief was based on two assumptions that seem to no longer apply. The first assumption was that low-income households would need a price discount to afford telephone service. As explained later, studies have shown that the discounts seem to have little bearing on low-income households' decisions to purchase access to telephone services. The second assumption was that landline

(footnote continued)

law also designated all incumbent landline providers as ETCs and directed regulators to develop policies whereby other carriers, such as mobile operators, could participate (see Holt & Jamison, 2007). As of this time, wireless carriers have ETC status in some states, but not in others. A second reason for landline dominance of the program is that current universal service policies treat landline operators differently than wireless operators and some telecommunications regulators view the participation of mobile operators in the system as a primary cause of growth in the total amount of subsidy. The main benefit of ETC status is to receive high-cost support—a federal subsidy for operating in high-cost areas. Based on a view that the high-cost support program has grown exponentially, the FCC has placed a cap on the high-cost fund monies available to non-incumbent ETCs. (Certain caps already existed on incumbent ETCs.) This may limit future wireless carrier applications for ETC status. (*High-Cost Universal Service Support, Federal-State Joint Board on Universal Service*, WC Docket no. 05-337, CC Docket no. 96-45, Order, Released May 1, 2008.) Where they have ETC status, wireless carriers offer Lifeline, for example Sprint and Alltel have wireless ETC status in Florida, although they have reported only a few Lifeline customers. A third reason for the dominance of landline providers could be regulatory inertia. State and federal laws on ETC status were written for landline carriers, and the statutes do not account for prepaid wireless. In fact, resellers are not allowed ETC status under the 1996 Telecommunications Act.

³ *MTS and WATS Market Structure, and Amendment of Part 67 of the Commission's Rules and Establishment of a Joint Board*, Recommended Decision, CC Docket nos. 78-72 and 80-286, 49 Fed. Reg. 48325 (rel. November 23, 1984) (recommending the adoption of federal Lifeline assistance measures); Decision and Order, CC Docket nos. 78-72 and 80-286, FCC 84-637, 50 Fed. Reg. 939 (rel. December 28, 1984) (adopting the Joint Board's recommendation). Report and Order and Further Notice of Proposed Rulemaking, WC Docket 03-109, In the Matter of Lifeline and Link-Up, Release no. FCC 04-87, (rel. April 29, 2004). See paras. 1–4 for the justification for the Lifeline/Link-Up programs. Specifically, 47USC. 254(b) establishes principles for preserving and advancing universal service, including the recognition that affordable telephone service is a national priority. As stated in para. 4 of FCC 04-87, "The Lifeline/Link-Up program is one of several universal service support mechanisms to further these goals."

⁴ Subscriber Line Charges are fees imposed by the Federal Communications Commission (FCC) on customers of landline local telephone service to recover some of the costs for local telephone lines. Traditionally, prices for local telephone service have not covered the entire cost of providing the line that provides the service.

local telephone service was essential for low-income households. The survey indicates that a majority of low-income households now choose to make mobile service their primary mode of telecommunications, and that such households choose mobile over landline at a rate that exceeds that of higher-income households.

A seeming lack of interest in Lifeline by low-income households in Florida, combined with other factors such as lack of awareness of the program, has resulted in low participation rates⁵ by households that are eligible for the program. In 2005, Florida's combined participation rate for Lifeline and Link-Up⁶ was approximately 13.2 percent (Holt & Jamison, 2006). The low participation rate in Florida's Lifeline program led state officials to consider the effectiveness of Florida's enrollment policies. While these enrollment policies were amended in 2007 to allow online enrollment and direct online access through Florida's Department of Children and Families (DCF) Offices,⁷ Florida's participation rate still is estimated to be relatively low, in the order of approximately 14 percent (FPSC, 2007). The current research shows that in addition to factors cited above, changes in low-income Floridians' preferences in telecommunications services negatively affect participation in the Lifeline program.

3. Literature survey

There are essentially two strains of the literature that impact the design of this research and also enlighten the results. First, Section 3 reviews those papers that consider substitutability between fixed and mobile telecommunications services and then addresses participation in the Lifeline program.

The growth in mobile technology has allowed mobile phones to serve as a viable and low-cost alternative to expanding universal service among low-income households and across rural areas where landline phones can be expensive to install. This is especially the case in many developing countries. For example, despite some government constraints (such as excessive license fees), India's mobile network coverage doubled in 2005; in the Philippines, mobile coverage has reached 99 percent of the population (GSM Association, 2006, pp. 43 and 49). By 2010, the GSM Association predicts 90 percent of the population of the world will have mobile telecommunications coverage as the speed of network deployment and lower fixed network costs give mobile telecommunications a clear advantage over landline services.

The substitution between landline and mobile phones has been influenced to a large degree by the growth of prepaid mobile phones. Worldwide, prepaid mobile phones represent a significant share of the global mobile phone market; among OECD countries the percentage share ranges from almost 95 percent (in Mexico) to less than 5 percent (in South Korea) (Center for Policy Research on Science and Technology, 2006, p. 10). In developing countries, innovations in prepaid service options have allowed rural customers to obtain access to communications services previously not possible. For example, in the Philippines the development of the Smart Buddy program allows mobile phone users to sell to other mobile phone users small increments of service. As a result, customers may purchase as few as 3 min of service at a time. Although unprofitable for the company to sell and distribute prepaid cards for such small amounts, the technological innovations that allow consumers to sell minutes to one another allows otherwise unserved customers to obtain service.

Prepaid mobile usage also has increased in the US. Sullivan (2008) illustrates that low-income households derive a clear economic benefit from mobile phones and therefore find them to be extremely important. In addition to using mobile communications, mobile phones have a "safety blanket" effect. Sullivan reports that when asked to choose the most important phone in an emergency situation, Americans now favor mobile over landline phones by more than three to one.⁸ The benefits of mobile service are extended by the availability of prepaid plans. Among low-income households participating in the current Hauge, Chiang, Jamison survey, telecommunications were more highly valued than among non-low-income households. Interestingly, the greatest reported value for landline communications was among low-income prepaid mobile users—the group with the least ability to obtain such service. Clearly the ability to obtain prepaid services has affected demand for mobile services among previously unserved households. These developments within the telecommunications industry have added further arguments to the debate that existing programs to expand universal service via landlines may not be efficient, particularly as participation rates in such programs remain low.

There have been several recent papers addressing Lifeline participation. A brief summary of such research begins with Rodini, Ward, and Woroch (2003), who illustrate the relationship between mobile and fixed line phone service. Mobile providers generally are not required to participate in the Lifeline program, although increasingly providers are choosing to do so.⁹ Low-income households choosing between mobile and landline services may therefore preclude their own

⁵ The participation rate is calculated as the number of households participating divided by the number of households eligible to participate.

⁶ The Link-Up program reduces the cost of telephone installation by 50 percent, up to a maximum of \$30. That reduction assumes the form of a credit and is deducted from the service installation charge.

⁷ DCF manages public assistance programs in Florida.

⁸ Sullivan's survey (2008) differs from the survey in this study in that in the Sullivan survey all calls were made to landlines; therefore, the Sullivan survey did not capture those households without phones (as the intercept survey in this study does), or those with a mobile phone only (as the mobile survey in this study does).

⁹ All designated ETCs, both landline and wireless, can offer Lifeline; however, in practice Lifeline is offered in Florida to wireless customers only through a rural ETC. While a customer can choose a wireless carrier and sign up for Lifeline, neither the DCF automatic enrollment procedure or the Florida Public Service Commission (FPSC) self-certification form tell the customer exactly what geographic area in Florida the ETC actually offers Lifeline service. When applying through DCF, qualified subscriber names are sent to the FPSC, who send the names to the carrier. If Lifeline is not available, the ETC notifies the FPSC, who notifies the subscriber that Lifeline is not available from his carrier of choice in that geographic area. With respect to prepaid cards,

subscription into the Lifeline program through their choice of mobile telecommunications. Rodini et al. find that fixed line and mobile services are reasonable substitutes for one another, and that subsidies to wireline carriers for universal service may be unjustified. Their finding is substantiated here, and confirms that low-income households have a statistically significant higher probability of owning a mobile rather than a landline phone. Low participation rates in Lifeline in Florida and the future of Lifeline have been the subject of prior research (see Brown & Jamison, 2005; Brown, 2006a, 2006b, 2006c; Hauge et al., 2007; Hauge, Jamison, & Jewell, 2008; Holt & Jamison, 2006, 2007; Williamson, 2006; Hauge & Jamison, Forthcoming). Among other findings, the prior research has shown that a lack of awareness of the program and a distrust of support programs were the most prevalent barriers to enrollment. Additionally, almost all low-income households in Florida (about 90 percent) had landline phones at the time of these studies (2005) even though only a small percentage took advantage of Lifeline. Further, the studies found that 52.2 percent of low-income households had a mobile phone, 44.8 percent had Internet access, and 59.1 percent had either cable television or direct satellite. This finding was important in that it suggested that low-income households may prefer communications services that did not qualify for Lifeline, in particular, mobile service. Additionally, the studies found that Lifeline participation rates were lower in areas where mobile penetration was higher, indicating that low-income households might prefer mobile phones to landline phones. These ideas, however, were not further addressed.

Currently, the Lifeline program is tangentially addressed in two areas of economic research: the effectiveness and importance of universal service in general, and the economics of participation in public assistance programs. Academic papers addressing federal assistance programs designed to increase telephone penetration rates have almost unanimously determined that such programs are ineffective and/or inefficient. For example, Rosston and Wimmer (2000) find that federal universal service programs have little effect on telephone penetration rates, adversely affect the market through large taxes, and adversely affect competition. Valletti, Hoernig, and Barros (2002) add that different groups of consumers are affected by universal service programs in different ways, so that determining the actual benefits to society overall is difficult. Regarding the cost-effectiveness of Lifeline specifically, Garbacz and Thompson (1997, 2002, 2003) find that due to small elasticities of demand for participation in the Lifeline program, extremely large expenditures per household on promoting Lifeline are required to increase the telephone penetration rate. Moreover, these effects have increased over the last decade; they find the Lifeline program to be ineffective, costly, and approximately nine times more expensive than a more targeted program might be.

With respect to participation in Lifeline, Burton, Macher, and Mayo (2007) consider Lifeline participation across the US and find that bureaucratic costs and restrictions that some Lifeline programs impose on supplementary services (such as call waiting and caller ID) discourage enrollee participation. They consider the outreach efforts of incumbent telecommunications providers as well as enrollment procedures and eligibility criteria to show that the traditional explanations for lack of participation (rooted in stigma) may not hold for the Lifeline program. This finding supports the research of Hauge, Jamison, and Jewell (2007) that finds incumbents' efforts to enroll beneficiaries to be statistically significant.

There also is a large literature on participation in public assistance programs. Currie (2004) summarizes the literature with respect to the largest means-tested programs in the US. Research on participation in Food Stamps, Federal Public Housing Assistance (FPHA), Medicaid, National School Lunch Program (NSLP), Supplemental Security Income (SSI), and Temporary Assistance to Needy Families (TANF) is particularly relevant to this paper, given that these public assistance programs are frequently used to prove eligibility for Lifeline. Studies of participation in other public assistance programs guide the statistical analyses and serve as useful references for the models used in this research. Generally, the literature concludes that participation in public assistance programs increases with the size of the entitlement and receipt of another benefit. Participation falls with age, education, income level, urban living, and work experience. Additionally, many studies searching for drivers of participation rates take into account intangible factors such as stigma and lack of information regarding the program, both of which would decrease participation in public assistance programs (see Hauge et al., 2007; Moffitt, 1983). Some research supports theories that either lack of information or simply a choice not to participate are dominant effects on participation in public assistance programs (Andrade, 2002).

With respect to lack of information, prior evidence based on 2005 surveys conducted by the University of Florida's Public Utility Research Center (see Brown & Jamison, 2005; Brown, 2006a, 2006b, 2006c) include interviews of Floridians in person and via landline telephone, as well as written surveys of households that qualified but did not participate and those that qualified and had disconnected their telephone service. Lack of information was shown to be a main indicator of non-participation in Lifeline in Florida. With new enrollment procedures in place and continued promotional efforts by telephone providers and associated interest groups, lack of information should be a decreasing reason for lack of participation. One aim of the current research is to determine whether this is the case. A second aim of this research is to evaluate low-income households' choices of telecommunications services with respect to landline and mobile options. The final goal is to put forward suggestions for the future of the Lifeline program based on the empirical findings.

(footnote continued)

at the time of the study no prepaid card provider (that was not a part of prepaid wireless service) had been approved as an ETC eligible to offer Lifeline. Some companies do offer Lifeline, for example, Alltel. Alltel provides Lifeline-eligible customers a discounted prepaid mobile plan, which starts at \$16.70 per month for 300 prepaid in-network minutes (accurate as of August 1, 2008). As a comparison, the most inexpensive non-discounted prepaid plan from Alltel starts at \$29.99 per month. Also participating in Lifeline in Florida are the wireless telecommunications providers NPCR Inc. and Sprint Nextel.

4. Data collection and methodology

4.1. Survey descriptions

The primary source of data for this report is three surveys designed by the authors and implemented by the Bureau of Economic and Business Research (BEBR) at the University of Florida. The use of survey instruments was required since no existing database provided detailed data on telecommunications purchases across all demographic categories and both primary forms of voice telecommunications (landline and mobile). The surveys consisted of three methods of implementation: calls to landline phones, calls to mobile phones, and in-person interviews called intercept surveys. The questions asked in these surveys addressed the respondent's communications services used, value placed on services, knowledge of Lifeline, experiences enrolling in Lifeline, and household characteristics. The data for this report comprised the following: 970 completed telephone surveys (491 landline and 479 mobile) from all types of households, not just low-income households, and 208 completed intercept surveys. Having both low-income households and non-low-income households in the surveys is important for analyzing how low-income households differ from higher-income households, if at all. Questions for the landline telephone survey were identical to the mobile phone survey.¹⁰ The rationale for offering two types of phone surveys (landline and mobile) derives from the presupposition that persons who rely solely on mobile phones might differ from the rest of the population in terms of their demographic characteristics. To avoid biased results, it was necessary to ensure an adequate number of respondents to both types of survey in order to account for likely differences in the populations that would be relevant for this study. This presupposition that the populations differ is borne out by the results presented in Section 5. Since other studies have found demographic characteristics to differ between mobile and landline survey respondents, it was essential to have obtained an equal number of responses from mobile and landline survey respondents.¹¹

The two phone-based surveys were conducted during the period from December 7, 2007, to February 1, 2008, and consisted of random-digit dialing across the state of Florida. For all survey methods, respondents were given an option to complete the survey in Spanish. The percentage of respondents choosing to complete the survey in Spanish included 5.1 percent of landline respondents, 5.7 percent of mobile respondents, and 2.4 percent of intercept respondents. The average time to complete the landline survey was 7.8 min; the average time to complete the mobile survey was 9.5 min.¹²

The intercept survey was conducted in January 2008 and targeted persons leaving Florida DCF offices in Jacksonville and Miami.¹³ DCF offices were selected for their relatively high proportion of persons from low-income households. The locations of Jacksonville and Miami ensured that the sample covered both south Florida and north Florida.¹⁴ The questions for this survey were identical to the telephone surveys with the exception of the inclusion of questions regarding the person's experiences in learning about or signing up for Lifeline at the DCF office.¹⁵ The average time to complete the intercept survey was 6.2 min.

To ensure the accuracy and anonymity of the survey implementation across all surveyors, BEBR managers trained each surveyor specifically on this survey. In addition, BEBR pre-tested all three surveys to ensure there were no errors in the survey programming and no confusing questions or other communications issues between the surveyor and respondent, and to ensure consistency across surveyors. Finally, all surveyors from the phone survey were randomly monitored by BEBR managers for quality control.

¹⁰ Because of the charges potentially incurred by respondents of the mobile survey (due to the receiving-party-pays system in the US), there was a risk that individuals would be reluctant to answer the survey questions. To reduce this risk, respondents completing a mobile survey were offered a \$10 gift card to Wal-Mart. The cost of receiving an incoming call ranges from zero (if the receiver has free minutes remaining on his plan), to an average overage cost of 40 cents/min. This would result in approximately \$3.80 in incurred costs for the average completed call duration of approximately 9½ min. A respondent with a prepaid mobile plan, by contrast, might incur approximately \$9.40 in costs for the same call. This charge would result if a prepaid customer had 0 min remaining and was charged roaming and toll charges (on average 59 and 40 cents/min, respectively). The authors do not have data regarding the actual cost to respondents to participate in the survey.

¹¹ For example, a study by the Pew Research Center found that the improved demographic representation for certain groups provides benefits that offset the increased costs of mobile surveys and asserts that exclusion of those relying solely on mobile phones would call into question the credibility of survey results (Pew, 2008).

¹² The greater average length of time to complete the mobile survey may be attributed to the need to call back a larger number of respondents to complete the survey. Respondents requested subsequent calls if they had inadequate minutes remaining, low battery power, or limited communication capability, for example.

¹³ The Jacksonville DCF Office is in Duval county (DCF District 4), located at 5920 Arlington Expressway, Jacksonville, FL 32211. Surveys were conducted on January 3, 4, 7–9, and 14, 2008. The Miami DCF Office is in Miami-Dade county (DCF District 11), located at 401 NW 2nd Avenue, North Tower 1007, Miami, FL 33128. Surveys were conducted January 7–11, 2008. One hundred and three responses were obtained in Jacksonville, and 105 were obtained in Miami.

¹⁴ While this ensured a sufficient number of low-income (and therefore potentially Lifeline-eligible) persons would be interviewed, it also introduced the possibility of sample selection bias. Sample selection bias was tested by comparing relevant demographic statistics for the entire state of Florida with those for Jacksonville and Miami, and for the counties in which the two cities are located. The differences were not statistically significant.

¹⁵ Specifically, the intercept survey included questions about what the person learned about Lifeline during the DCF visit, whether the person enrolled in Lifeline (if he or she was not already enrolled), and the factors affecting the decision to enroll or not enroll.

4.2. Data management

For each of the phone and intercept surveys, BEBR designed a software program to allow surveyors to enter responses directly into a database and to easily navigate the survey based on the responses. This resulted in an appropriate subset of questions to be asked to different respondents based on those respondents' prior answers. For example, a respondent stating he had only a landline phone was not asked questions pertaining to his mobile telephone usage. Completed responses were compiled into a separate database for each of the three survey methods and were converted and exported into STATA for analysis.

Next, the data were tested for response accuracy. This was accomplished by looking at outliers in the responses, mean values, median values, standard deviations, and minimum and maximum values;¹⁶ of 970 observations from the phone surveys, this resulted in five observations being dropped.¹⁷ A final data issue to be addressed occurred when a respondent was uncertain how to answer a question or refused to answer a question.¹⁸ To account for "don't know" and "refused" responses, the particular response that was unknown or refused was excluded for that observation. The response rate for total completed observations was 44.1 percent for landline surveys and 31.0 percent for mobile surveys.¹⁹

5. Statistics and results

5.1. Demographics and eligibility of survey respondents

Table 1 describes the demographic makeup of the survey respondents, by reported income level.²⁰ Comparing demographic statistics between phone surveys and intercept surveys, several significant differences are present. Intercept survey respondents were more likely to be women, to be younger on average, to rent their residence, and to have larger household size and more children.²¹ In addition, some demographic variables differ between the landline and mobile survey. In particular, the average age of respondents to the mobile survey was lower than the sample mean age of respondents for the landline survey.

Fig. 1 illustrates the age-related findings in greater detail and plots the percentage distribution of respondents by age group for each survey method. The figure shows that the mobile survey respondents were similar to the intercept survey respondents in terms of the distribution of respondents by age groups, while landline respondents tended to be older.

A central focus of this paper is the analysis of telecommunications choices among low-income households. Fig. 2 compares household incomes for the respondents in the three surveys. The respondents in the intercept survey had statistically significantly lower incomes than the respondents in the other two surveys.²² The mobile survey appeared to capture persons with slightly lower incomes than did the landline survey, but the differences were small. A broad conclusion from Figs. 1 and 2 is that the phone surveys generally captured higher-income households than did the intercept survey, while the intercept and mobile surveys generally captured younger respondents than did the landline survey.

Table 1 also provides the (reported) ethnic makeup of the survey respondents and compares ethnicity with the proportions of low-income and non-low-income respondents. The data indicate that the mobile survey had higher proportions of black and Hispanic respondents than did the landline survey. The intercept survey had a higher proportion of black respondents than the mobile survey, but approximately the same proportion of Hispanic respondents. Further, the data indicate that the mobile survey had higher proportions of low-income black, white, and Hispanic respondents than did the landline survey.

¹⁶ Outliers were scrutinized as they typically are a leading indication of an incorrect or invalid response. The source of incorrect responses could be due to the following: (1) an error by the surveyor in recording a legitimate response, (2) an error by the respondent due to a misunderstanding of the question, and/or (3) an error by the respondent due to intent to exaggerate or refusal to report an accurate response. It is not possible to determine in all cases whether an outlier falls into one or more of the categories above or whether a response was in fact a truthful response, and hence, a true outlier. Further, it is not possible to determine in all cases whether a non-outlier response is an incorrect response. Therefore, manual corrections to the data were limited by deleting only those responses beyond the 99th percentile of the range of responses and clearly beyond reason.

¹⁷ Two landline survey respondents and three mobile survey respondents more than once chose answers that were mutually exclusive and provided at least one response beyond the 99th percentile range of responses. These observations, therefore, were excluded in their entirety. Additional details are available from the authors upon request.

¹⁸ Surveyors were instructed to indicate for each question whether a respondent chose one of these options, i.e., a "don't know" or a "refused" response. Such responses are often genuine when survey respondents are not aware of specifics relating to their telephone usage; for example, one's total usage or monthly bill if that person is not the person typically handling such documents. A refusal to respond was more common in response to demographic questions such as age, ethnicity, and income.

¹⁹ The response rate is calculated using the total number of calls connecting to a person who then had the opportunity to participate in the survey or to decline to participate.

²⁰ Response rates per question are provided in Appendix A. Additionally, details on the manner in which respondents were classified as low-income or non-low-income are provided in Appendix B.

²¹ Based on a two-sample mean comparison test, these differences are statistically significant across all comparisons at any level greater than 0.1 percent, meaning there is a high probability that the variations are not due to random sampling.

²² The level of significance is 0.1 percent. This is expected because the phone surveys sampled a cross section of Floridians with phones, while the intercept survey sampled only Floridians who visited DCF offices.

Table 1

Sample means, number and percentage of respondents for each demographic indicator and reported ethnicity by low-income criterion and survey method, 2008..

Demographic	Number or percent of respondents								
	Landline survey			Mobile survey			Intercept survey		
	All	Low-income?		All	Low-income?		All	Low-income?	
		Yes	No		Yes	No		Yes	No
Female (%)	61.7	74.0	57.3	50.0	48.0	48.7	82.7	83.9	64.7
Age (years)	53.8	49.9	52.8	40.8	35.2	41.7	35.5	34.6	42.9
Own home (%)	85.3	64.6	86.8	57.1	23.2	66.4	19.3	17.6	35.3
Household size	2.6	3.7	2.5	3.2	4.1	3.0	3.4	3.5	3.1
Number in household under 18	0.5	1.4	0.5	0.9	1.4	0.8	1.4	1.4	1.1
<i>Ethnicity</i>									
White	282	9.9%	90.1%	238	17.7%	82.3%	56	92.9%	7.1%
Black	31	29.0%	71.0%	71	36.6%	63.4%	93	89.2%	10.8%
Hispanic	36	25.0%	75.0%	82	37.9%	62.1%	41	95.1%	4.9%
Asian	5	39.2%	60.8%	10	20.1%	79.9%	3	65.7%	34.3%
Native American	3	35.5%	64.5%	8	24.8%	75.2%	7	100.0%	0.0%
Other	3	68.2%	31.8%	6	0.0%	100.0%	11	90.9%	9.1%
Total	360	14.2%	85.8%	415	24.8%	75.2%	211	91.5%	8.5%

Note: The “All” columns include respondents who did not report their income and, therefore, were not included in either the “low-income” or “non-low-income” calculations.

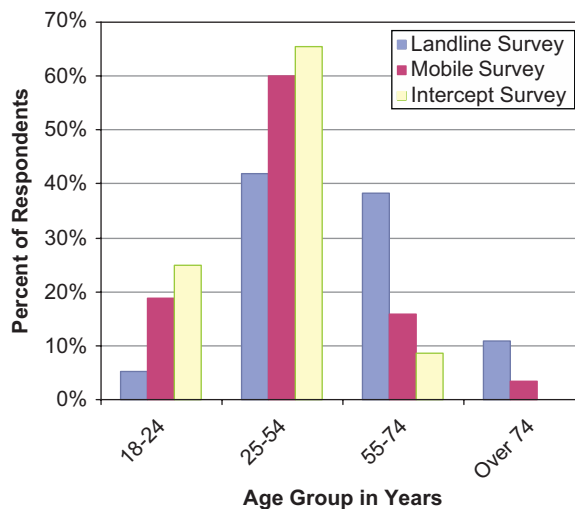


Fig. 1. Percent of respondents by age group for each survey method, 2008.

In summary, the landline survey respondents tended to have higher incomes than the mobile or intercept survey respondents, with the intercept survey respondents tending to have much lower incomes on average than the respondents of the other two surveys. Landline survey respondents also tended to be older than the mobile and intercept survey respondents. The mobile and intercept survey respondents were more likely to be from minority groups—black and Hispanic respondents—who, based on reported household income, were also more likely to be eligible for Lifeline discounts.

5.2. Preferences in communications services

The modes of communications used by respondents in each survey are summarized in Table 2, including the total number of respondents with landline and mobile phones, along with a summary of respondents who used only landline, only mobile, both landline and mobile phones, and neither form of communications.

Table 2 shows that 56.3 percent of mobile survey respondents subscribe to a landline phone and 47.1 percent of the intercept survey respondents subscribe to a landline phone. Furthermore, 83.2 percent of landline survey respondents

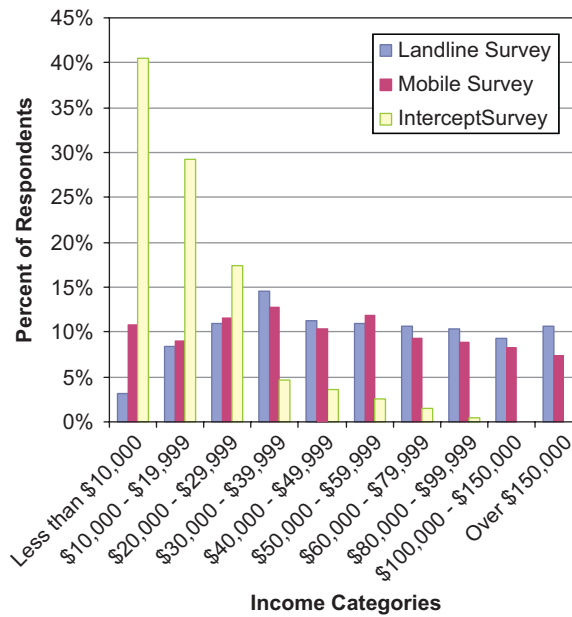


Fig. 2. Comparison of income categories of respondents by survey method, 2008.

Table 2

Number of respondents choosing each mode of communication by low-income criterion and survey method, 2008.

Modes of communications	Landline survey			Mobile survey			Intercept survey		
	All	Low-income?		All	Low-income?		All	Low-income?	
		Yes	No		Yes	No		Yes	No
Uses landline	489	50	307	268	32	182	98	87	9
		100%	100%		32%	61%		47%	53%
Uses mobile	407	33	267	476	100	298	158	139	15
		66%	87%		100%	100%		74%	88%
Uses only landline	80	17	39	n/a	n/a	n/a	30	29	1
		34%	13%					16%	6%
Uses only mobile	n/a	n/a	n/a	208	68	116	90	81	7
					68%	39%		43%	41%
Uses landline and mobile	407	33	267	268	32	182	68	58	8
		66%	87%		32%	61%		31%	47%
Uses neither landline nor mobile	n/a	n/a	n/a	n/a	n/a	n/a	17	17	0
								9%	0%
Refused to answer ^a	2	0	1	0	0	0	3	2	1
		0%	0.3%	0%	0%	0%		1%	6%
Total	489	50	307	476	100	298	208	187	17

Note: The "All" columns include respondents who did not report their income and, therefore, were not included in either the "low-income" or "non-low-income" calculations.

^a For the landline survey, a refused answer indicates that the respondent did not answer whether he or she had a mobile phone. For the mobile survey, a refused answer indicates that the respondent did not answer whether he or she had a landline phone. For the intercept survey, a refused answer indicates that the respondent did not answer one or both of the questions pertaining to landline and mobile phone ownership.

subscribe to a mobile phone, and 76 percent of intercept survey respondents subscribe to a mobile phone. This means that of respondents reached by a means other than a landline phone, only about one-half had a landline phone, but of those reached by a means other than a mobile phone, over three-fourths had a mobile phone. This would imply that mobile phones are becoming the preferred mode of voice communications.

The data also reflect a growing trend in that those who subscribe only to one form of communication (landline or mobile phone) are increasingly choosing a mobile phone. Just 16.4 percent of landline survey respondents and 14.4 percent of intercept survey respondents purchased only landline service. In contrast, 43.7 percent of mobile respondents and 43.3 percent of intercept respondents reported having only a mobile phone. Interestingly, among low-income households, the

probability of owning a mobile phone (either alone or in addition to a landline phone) is statistically dependent only on household income; age, reported value of the service, gender, home ownership, race, and ethnicity are not statistically significant determinants of mobile phone ownership.²³ However, among non-low-income households, the probability of owning a mobile phone is negatively correlated with age, and the probability of owning a landline phone is positively correlated with age, the value of the service, and the value of mobile service. These results suggest that among low-income households, respondents' status as low-income is a defining characteristic. The finding that a greater proportion of low-income households are choosing mobile over landline service supports this assertion. Additionally, it appears that among non-low-income households, the choice of mobile service involves factors in addition to income. These factors can include respondent characteristics such as age, but also could include complementary features in more advanced mobile phones such as built-in cameras, photo storage, and music capabilities. In other words, the choice for mobile service among non-low-income households may include consideration of factors other than whether to subscribe to basic mobile service.²⁴

Respondents who are reportedly low-income are more likely to use only mobile phones than respondents who are non-low-income. From Table 2, 68 percent of low-income respondents in the mobile phone survey have a mobile phone but no landline phone. This is significantly higher than for non-low-income respondents, of which only 38.9 percent use mobile phones exclusively. In contrast to the high percentage of mobile-only low-income respondents, in the landline survey, only 34 percent of the low-income respondents reported having only a landline phone.²⁵

Statistically, those respondents in the lowest two income ranges (\$0–9999 and \$10,000–19,999 annually) have significantly higher average mobile-only ownership than other income groups.²⁶ While data show that persons in the lowest two income groups are more likely than persons in the higher-income groups to have mobile service only, similar conclusions cannot be made about landline-only respondents. Differences in landline-only use among income groups are not statistically significant.

Based on the intercept survey results, only 46.5 percent of low-income households have a landline phone, and only 15.5 percent reported having only a landline phone. In a previous study, Brown and Jamison (2005) estimated that 90.4 percent of low-income households had a landline phone. To the extent the statistics are comparable, they indicate a significant shift in mobile telephone usage among low-income households to the point at which landline phones are increasingly purchased as income rises or as part of a bundle, for example, with Internet DSL service. In other words, mobile phones are surpassing landline phones as the primary mode of communication. The current intercept survey indicates that 74 percent of low-income households have mobile phones. In contrast, Brown and Jamison found about 50 percent of low-income households had a mobile phone.

5.3. Value of communications services

A key question relating to patterns of telecommunications usage among low-income households is how respondents estimate the value of their telecommunications service. These estimates of value approximate the respondent's demand, which can be used to estimate consumer surplus (the difference between value and estimated monthly bill). The survey data indicates that the average consumer surplus for low-income households is \$29.39 for landline service and \$50.18 for mobile service, while average consumer surplus for non-low-income households is \$12.68 for landline service and \$32.81 for mobile service. Because income levels may influence value estimates, it is the respondent at the margin (where typical monthly bills slightly exceed value of service) for whom programs such as Lifeline should be most influential.

Table 3 summarizes the results from the survey questions about the value of landline and mobile services.²⁷ Data indicate that of landline survey respondents, low-income respondents, on average, value their landline telephone service nearly 60 percent more than non-low-income respondents. For mobile survey respondents this difference is over 50 percent. This may result from higher proportions of low-income customers having only one type of phone, making this phone more valuable to them than to customers who have both landline and mobile phones. Also, low-income respondents are shown to be more price sensitive than higher-income respondents, as indicated by the higher percentages of low-income respondents, who reported that they would cancel either service should their monthly bills rise.

Table 3 also indicates that the penetration of prepaid mobile phones has almost doubled for low-income households in the past 3 years (see Holt & Jamison, 2006, 2007; Brown & Jamison, 2005; Brown, 2006a, 2006b, 2006c) for information on penetration rates in 2005. According to the 2005 survey of low-income households (Brown, 2006c), 11.3 percent indicated that they had a personal prepaid mobile phone. In contrast, in the current landline, mobile, and intercept surveys, respectively 30 percent, 13.3 percent, and 23 percent of low-income respondents indicate that they use prepaid mobile phones. The data also

²³ Summary statistics for all variables used in the empirical analysis are provided in Appendix C.

²⁴ The survey did not ask respondents about the features of their phones, or the primary use of their phones. Consequently, the authors are unable to comment further on potential preferences and tastes of respondents.

²⁵ The percentage of low-income and non-low-income respondents with only mobile phones is similar among intercept survey respondents, at 43.3 percent and 41.1 percent, respectively. However, the number of intercept survey respondents who are non-low-income was small (17 out of 208 respondents), so it is difficult to place much confidence in the accuracy of the 41.1 percent statistic.

²⁶ In particular, the proportion of respondents in the two lowest income ranges who chose only mobile service is statistically higher than all higher-income groups. The next highest income group differs from these two groups with a significance level of 0.7 percent.

²⁷ Respondents were asked, "Regardless of what you actually pay for (this service) each month, how much is this service worth to you each month?"

Table 3

Average responses regarding monthly bills, value of landline and mobile services, and landline and mobile usage by low-income criterion and survey method, 2008..

	Average responses								
	Landline survey			Mobile survey			Intercept survey		
	All	Low-income?		All	Low-income?		All	Low-income?	
		Yes	No		Yes	No		Yes	No
<i>Landline service</i>									
Percent would cancel if bill increased \$10	36.3	58.1	35.6	37.8	46.7	34.7	54.3	56.6	22.2
Percent would cancel if bill increased \$20	69.6	84.4	67.8	71.8	83.9	70.7	74.0	74.7	57.1
Value of landline service (\$)	74.53	109.86	70.82	63.86	91.67	60.54	85.14	83.15	112.29
<i>Mobile service</i>									
Percent would cancel if bill increased \$10	21.9	52.2	18.9	24.7	28.9	22.5	36.1	39.3	15.4
Percent would cancel if bill increased \$20	55.3	86.4	49.1	57.2	62.8	56.3	72.4	75.0	58.3
Value of mobile service (\$)	104.91	122.85	108.68	127.34	120.88	127.83	129.22	127.38	155.94
<i>Usage variables</i>									
Percent of total calls made on mobile	49.2	40.4	53.2	63.8	56.8	66.1	58.9	56.6	65.9
Percent of long distance made on mobile	44.7	25.0	48.9	51.4	41.1	52.1	46.1	41.8	76.3
Percent using prepaid mobile	15.3	30.0	15.2	6.4	13.3	5.1	22.6	23.0	18.8

Notes: The "All" columns include respondents who did not report their income and, therefore, were not included in either the "low-income" or "non-low-income" calculations. Usage Variables include only those respondents with both a landline and a mobile phone.

indicate that non-low-income Floridians make larger proportions of their calls using mobile phones than landline phones, relative to low-income Floridians. Further, the data show that low-income households (those who are presumed eligible for the Lifeline program) are more likely to use prepaid mobile calling plans than non-low-income households.²⁸ The implications of this preference are discussed further in Section 6, as such implications imply that Lifeline discounts might be more beneficial to low-income households if applied to prepaid mobile phones than to landline or postpaid mobile phones.

These findings point to the possibility of an increasing tendency for consumers to use mobile phones for their calls. Brown (2006b) states that in 2005, 21.3 percent of the respondents used their mobile phones for most of their calls. Table 3 above shows that consumers are now making on average half or more of their calls on mobile phones. Also, Brown (2006b) showed that consumers tended to indicate that their landline phones were more valuable to them than their mobile phones.²⁹ In contrast, Table 3 illustrates that both low-income and non-low-income consumers on average view their mobile phones as more valuable than their landline phones. These patterns indicate an increasing tendency for consumers to see mobile as their normal and preferred mode of communications, regardless of income level.

To determine the potential marginal impact of subsidies on landline and mobile subscriptions, this study estimated demand elasticities based on hypothetical changes in prices. Elasticity can be calculated roughly based on the percentage of respondents that would cancel their current service (landline or mobile) following a given percentage increase in estimated monthly bills. The elasticity estimates, expressed as positive numbers, are as follows:³⁰

Low-income elasticity for landline: $E = 50.0\%/20.0\% = 2.50$

Non-low-income elasticity for landline: $E = 32.6\%/20.0\% = 1.63$

Low-income elasticity for mobile: $E = 24.0\%/16.7\% = 1.43$

Non-low-income elasticity for mobile: $E = 20.8\%/15.4\% = 1.35$

Using these estimates, one can conclude that the demand for mobile service is less price elastic than the demand for landline service; in other words, price has less impact on mobile service than landline service. In addition, low-income respondents have more elastic demand than non-low-income respondents. Finally, the elastic demands suggest that

²⁸ Of landline survey respondents, prepaid is twice as likely; of mobile survey respondents, prepaid is two and a half times as likely; of intercept survey respondents, prepaid is 30 percent more likely.

²⁹ The survey found that 42.7 percent of respondents indicated that their landline phones were their most valuable communications purchase, while 26.5 percent indicated that their mobile phone was their most valuable communications purchase.

³⁰ Formally, the percentage of respondents that would drop their current service (landline or mobile) is divided by the percentage change in price (calculated as either a \$10 or \$20 increase in price divided by the median reported monthly bills for the service (landline or mobile)). Of course consumers' statements about what they would do if prices were to change can be different from what they really do when confronted with a price change. As a result, the findings roughly indicate orders of magnitude and relative sensitivity to price changes.

Table 4

Reasons for not subscribing to landline service and percentage of respondents with landline service within the past five years, by low-income criterion and survey method, 2008..

Category	Mobile survey			Intercept survey		
	All	Low-income?		All	Low-Income?	
		Yes	No		Yes	No
Respondents with no landline	208	68	116	110	100	8
Willingness-to-pay for landline (\$)	43.7%	68.0%	38.9%	52.9%	53.5%	47.1%
Percent with landline in past 5 years	23.40	31.58	18.21	30.73	31.60	25.63
	60.9	58.2	63.8	63.6	63.0	62.5
<i>Reasons for no landline phone</i>						
Too expensive	51	14	30	47	44	2
Do not need	96	26	60	10	9	1
Do not want	65	16	41	10	8	2
Have cell phone	117	37	69	54	51	3
Changed to broadband	32	11	18	1	1	0
Recently moved	35	16	16	14	13	1
Move too frequently	17	9	8	6	6	0
Other	40	12	22	12	10	1

Note: The "All" columns include respondents who did not report their income and, therefore, were not included in either the "low-income" or "non-low-income" calculations.

consumers have alternatives to their current service, such as choices among landline, mobile and Internet services, among carriers within each service, and between prepaid and postpaid services.

The respondents who use prepaid mobile calling plans indicated that the ability to control phone costs was the primary motivation for using prepaid mobile, especially among low-income households. Earlier studies concluded that low-income households discontinued landline service because it was either unaffordable or the household preferred to spend its income on other things. This paper asserts that prepaid mobile phones provide low-income households with an opportunity to manage their communications expenditures, consistent with their more elastic demand, and so may be more suitable than a landline phone to a low-income household's lifestyle.³¹ This further supports the idea that prepaid mobile service might be more suitable for Lifeline than is landline service.

In providing rationales for the increasing number of respondents who choose not to subscribe to a landline service, Table 4 summarizes the reasons for non-subscription indicated by respondents, including respondents' reported willingness-to-pay for landline service as an indicator of its value. Finally, Table 4 includes whether the respondent reported having landline service at some point within the last 5 years in order to estimate the extent to which respondents may have canceled landline service as opposed to never having received it.

The data indicate that first, low-income respondents reportedly are more willing to pay for a landline phone than are non-low-income respondents. Secondly, low-income respondents are more likely not to have a landline phone due to a recent move, perhaps suggesting that lower-income households relocate more frequently than higher-income households.

5.4. Lifeline awareness and participation

Table 5 illustrates the determinants of participation in Lifeline,³² including the number of presumed eligible and presumed non-eligible respondents that fall within each reported income category. It indicates that respondents in the mobile survey were more likely to be from households presumed eligible for Lifeline than those in the landline survey: 25 percent of the mobile respondents are presumed eligible, while only 14 percent of the landline respondents are presumed eligible. This is consistent with results shown in Fig. 2. The intercept survey respondents were more greatly concentrated in presumably eligible households; over 90 percent of the intercept survey respondents are presumed eligible.

³¹ Specifically, the following primary reasons for subscribing to prepaid mobile service were given by respondents across the landline, mobile, and intercept surveys: No Monthly Bill (37 percent, 40 percent, and 58 percent, respectively), To Save Money (38 percent, 50 percent, and 42 percent, respectively), Low Cell Phone Usage (55 percent, 17 percent, and 25 percent, respectively), To Predict Expenses (28 percent, 50 percent, and 42 percent, respectively), and No Credit Check Required (8 percent, 33 percent, and 33 percent, respectively). Percentages are based on 60, 30, and 36 respondents across the three surveys, respectively.

³² Our classification of respondents as presumed eligible for Lifeline or not presumed eligible is based on the Federal Poverty Guideline (FPG) that associates low-income status by household size and income, as discussed in detail in Appendix B.

Table 5

Number of presumed eligible and presumed non-eligible respondents by income category given household size, 2008..

Income category	Landline survey		Mobile survey		Intercept survey	
	Presumed eligible	Presumed non-eligible	Presumed eligible	Presumed non-eligible	Presumed eligible ^a	Presumed non-eligible
Less than \$10,000	11 22%	0 0.0%	43 43%	0 0.0%	79 44.4%	0 0.0%
\$10,000–19,999	21 42%	9 2.9%	29 29%	7 2.4%	57 32.0%	0 0.0%
\$20,000–29,999	12 24%	27 8.8%	20 20%	26 8.7%	28 15.7%	6 35.3%
\$30,000–39,999	4 8%	48 15.6%	5 5%	46 15.4%	7 3.9%	2 11.8%
\$40,000–49,999	2 4%	38 12.4%	3 3%	38 12.8%	5 2.8%	2 11.8%
\$50,000–59,999	0 0.0%	39 12.7%	0 0.0%	47 15.8%	2 1.1%	3 17.6%
\$60,000–79,999	0 0.0%	38 12.4%	0 0.0%	37 12.4%	0 0.0%	3 17.6%
\$80,000–99,999	0 0.0%	37 12.1%	0 0.0%	35 11.7%	0 0.0%	1 5.9%
\$100,000–150,000	0 0.0%	33 10.7%	0 0.0%	33 11.1%	0 0.0%	0 0.0%
Over \$150,000	0 0.0%	38 12.4%	0 0.0%	29 9.7%	0 0.0%	0 0.0%
Total ^b	50	307	100	298	178	17

^a The number of presumed eligible respondents in the intercept survey was based not only on reported household income and household size, but also on whether the respondent applied for any of the qualifying government assistance programs that would make him or her eligible for Lifeline.

^b There were 132 landline, 78 mobile and 13 intercept respondents who did not report their household incomes.

In addition to identifying households presumed to be eligible for Lifeline, it is important for policymakers to be aware of those households' knowledge of and perceived value of the program. As shown in Table 6, among presumed eligible respondents to Lifeline, only 10.2 percent of landline survey respondents, 4.1 percent of mobile survey respondents, and 19.9 percent of intercept survey respondents enrolled in Lifeline, a lower participation rate than found in earlier studies (see Brown & Jamison, 2005; Brown, 2006a, 2006b, 2006c). This may be influenced by what appears to be a growing number of low-income households relying only on mobile services.

Based on the data, awareness of the Lifeline program remains an important factor in those not participating (in the three surveys, 20.0 percent, 23.2 percent, and 50.3 percent of Lifeline-eligible respondents in the landline, mobile, and intercept surveys were aware of the program, respectively). However, even when aware of the program, the participation rate was low. Among the respondents who were aware of the program, the participation rate for landline, mobile, and intercept surveys was 50.0 percent, 17.4 percent, and 39.8 percent, respectively—still generally low. With respect to intercept survey respondents, separating those who appeared not to enroll because they had concerns about the program from those who did not enroll for other reasons, the majority (72.5 percent) did not participate for what might be deemed “logical” reasons, such as they did not have a phone.³³ Such reasons cannot readily be addressed through changes in the enrollment process (e.g., not having or not wanting a landline phone accounts for 76 percent of those who appeared to understand the program and chose not to participate). Therefore, a factor that policymakers should find of primary importance is the relatively large number of respondents who do not have a landline phone (44 percent of mobile survey respondents and 53 percent of intercept survey respondents) so are unable to participate in Lifeline.³⁴ Of additional interest is the total number of respondents who reportedly do not participate due to some degree of difficulty associated with enrolling; one-third (22 of 66) of respondents to this question fall into this category.

A final question asked of non-Lifeline participants in each survey was the amount of subsidy that would induce the respondent to sign up for Lifeline. Interestingly, for all three surveys, the required subsidy among presumed eligible respondents was higher than the required subsidy to encourage presumed non-eligible respondents to participate. In other words, those who were eligible to receive the subsidy actually were less willing to sign up than those who were not eligible. Among the lowest two income ranges, being younger, female, and less educated are significantly correlated with requiring

³³ “Logical” reasons include the following: no phone in home or in person's name, don't want a home phone, prefer a cell phone, already get Lifeline, don't think I'm eligible, don't want Lifeline, may move soon, and have cable Internet rather than phone. Reasons suggesting possible misunderstanding of the program include the following: already have a phone, don't have Comcast as a provider, always a catch, didn't know what it was, don't care, thought I needed proof, and I only have one phone line. One person is not classified in the above with the response “just missed it.”

³⁴ See Table 4 (and Table 2 for raw numbers).

Table 6

Average percentages of persons indicating knowledge of and perceived value of Lifeline by survey method, 2008..

Category	Percents of respondents								
	Landline survey			Mobile survey			Intercept survey		
	All	Presumed eligible		All	Presumed eligible		All	Presumed eligible	
		Yes	No		Yes	No		Yes	No
Percent aware of Lifeline	18.2	20.0	18.2	17.7	23.2	15.1	50.5	50.3	64.7
Percent subscribe to Lifeline	1.7	10.2	n/a	2.1	4.1	n/a	18.4	19.9	n/a
Percent of aware that subscribe	8.2	50.0	n/a	11.9	17.4	n/a	36.5	39.8	n/a
Percent requested information	35.5	71.1	38.2	36.9	56.3	34.5	n/a	n/a	n/a
Percent would sign up if eligible	57.3	66.7	61.8	53.2	66.0	49.8	79.8	81.1	62.5
Percent saw option to sign up	n/a	n/a	n/a	n/a	n/a	n/a	45.2	50.0	n/a
Percent signed up at DCF office	n/a	n/a	n/a	n/a	n/a	n/a	8.7	9.6	n/a

Note: The "All" columns include respondents who did not report their income and, therefore, were not included in either the "presumed eligible" or "presumed non-eligible" calculations.

a higher incentive in order to sign up for Lifeline. At income levels greater than the lowest two, this result reverses: being older and male is associated with requiring a higher incentive to sign up for Lifeline. It is difficult to understand why this might be true, but this finding is consistent with the low percentage (19.9 percent) of presumed eligible respondents exiting a DCF office who actually signed up for Lifeline.

6. Conclusion

This study serves to explain choices of low-income households with respect to landline and mobile phone services, and to relate the impacts of these choices on enrollment in Lifeline. Important implications for universal service policies have emerged as a result. The research indicates that low-income households are migrating quickly from landline phones—which have been the focus of Lifeline efforts—to mobile phones, which only recently are becoming eligible for Lifeline discounts; mobile phones are becoming the preferred mode of voice communications regardless of income level.

Data also reflect a growing trend in that those who subscribe to only one form of communication (landline or mobile phone) are increasingly choosing a mobile phone, and this is more pronounced for low-income households than for higher-income households. Additional analysis on how the income effect changes the demand for landline and mobile services would be useful in confirming this hypothesis, but requires additional survey data on respondent's income and communications choices over time. A contributing factor to the increase in mobile usage is the availability of prepaid mobile phones. Based on the data, the penetration of prepaid mobile phones has almost doubled for low-income households in the past 3 years, apparently because prepaid mobile phones make it easier to manage telecommunications expenditures.

With respect to the Lifeline program, low participation rates appear to be influenced by changing patterns in modes of communications and lack of awareness of Lifeline. This research implies some possible avenues for improving the current Lifeline program. First, there should be less emphasis on landline service and more opportunities for eligible households to obtain discounts on prepaid mobile phones. Mobile phones, in particular prepaid mobile phones, are becoming the communications mode of choice for low-income households. The current focus on landline phones could be an impediment to low-income households' adoption of more advanced telecommunications technologies.

Secondly, there is a need to reexamine whether price discounts are an important feature for Lifeline. Prices do not appear to be a primary barrier to low-income households' use of telecommunications services. Frequency of moving for low-income households appears to be one of the major impediments to having a phone. An emphasis on helping low-income households obtain mobile phones might be more effective than price discounts, especially price discounts on landline phones.

Thirdly, to the extent that price discounts remain a feature of outreach to low-income households, a program should be designed that does not favor one technology over another. For example, a program that provides a technology-neutral communications stamp could allow low-income households to easily migrate to VoIP, broadband, or other new technologies.

Finally, participation procedures can be simplified. The processes for learning about Lifeline, determining eligibility, and signing up remain a hindrance. In lieu of less targeted marketing approaches, perhaps outreach events and DCF offices could distribute cards for prepaid wireless phones or could provide prepaid phones at a discount. Perhaps Lifeline wireless prepaid minutes could be sold at grocery stores and department stores, where a person could qualify to purchase such minutes in the same way he or she currently uses food stamps or prescription drug discounts.

In general, rapidly evolving technologies and customer preferences make it increasingly problematic for telecommunications regulators and policymakers to develop universal service policies that target specific services. The policies bias markets towards increasingly outdated services, perhaps to the detriment of the very consumers the policies were intended to benefit. However, it also can be problematic to target services in advance of revealed demand because customer

preferences and technologies evolve in unpredictable ways. Perhaps the most effective universal service policies will be those that decrease bureaucracy and simply supplement market forces by focusing on increasing the value customers find in communications services and decreasing the costs of adopting new services.

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Appendix A. Response rates for individual survey questions

The three survey samples, which constitute the primary source of data for this report, were completed by randomly selected respondents on a strictly voluntary basis. Some respondents occasionally chose not to answer a particular question posed from the survey. Subsequently, the number of responses for each question varied in each of the surveys. Because the

Table A1

Number of responses and total respondents asked by question and by survey method, 2008..

Question	Landline survey	Mobile survey	Intercept survey
Gender	488/489 99.8%	476/476 100%	208/208 100%
Age	471/489 96.3%	467/476 98.1%	206/208 99.0%
Own or rent residence	475/489 97.1%	469/476 98.5%	202/208 97.1%
Total number of persons in household	477/489 97.5%	475/476 99.8%	207/208 99.5%
No. of children under age 18 in household	474/489 96.9%	469/476 98.5%	207/208 99.5%
Household income	357/489 73.0%	398/476 83.6%	195/208 93.8%
Estimated landline monthly bill	405/489 82.8%	236/268 88.1%	93/98 94.9%
Would cancel if landline bill increased \$10	443/489 90.6%	249/268 92.5%	94/98 95.9%
Would cancel if landline bill increased \$20	444/489 90.8%	252/268 94.0%	96/98 98.0%
Value of landline service	377/489 77.1%	226/268 84.3%	91/98 92.9%
Estimated mobile monthly bill	300/331 90.6%	421/438 96.1%	120/122 98.4%
Would cancel if mobile bill increased \$10	322/331 97.3%	424/438 96.8%	120/122 98.4%
Would cancel if mobile bill increased \$20	320/331 96.7%	427/438 97.5%	121/122 99.2%
Value of mobile service	332/407 81.6%	419/476 88.0%	151/158 95.6%
Total usage by mobile phone	370/407 90.1%	445/476 93.5%	148/158 93.7%
Total long distance usage by mobile phone	389/407 95.6%	460/476 96.6%	155/158 98.1%
Prepaid mobile service	391/407 96.1%	468/476 98.3%	158/158 100%
Ethnicity	472/489 96.5%	471/476 98.9%	208/208 100%
Aware of Lifeline	488/489 99.8%	475/476 99.8%	208/208 100%
Subscribes to Lifeline	481/489 98.4%	471/476 98.9%	207/208 99.5%
Would sign up if eligible	431/479 90.0%	436/466 93.6%	206/207 99.5%

Table B1
Maximum household income (\$) for Lifeline eligibility in 2008..

Household size	135% of FPG (maximum income)
1	14,040
2	18,900
3	23,760
4	28,620
5	33,480
6	38,340
7	43,200
8	48,060
9	52,920
10	57,780

summary statistics of a number of key variables were presented in percentages in the tables, it is sometimes helpful to know the actual number of respondents to which those percentages apply. Table A1 lists the number of responses for selected questions of primary importance along with the total respondents to whom that question was posed. The ratio between these two numbers represents the response rate for each respective question, shown as a percentage beneath each ratio. The data in Table A1 shows that response rates in general are highest for the intercept survey and lowest for the landline surveys. This finding is consistent with research by Hox and De Leeuw (1994), which showed in an analysis of 45 separate studies on response rates among mail, telephone, and intercept surveys that intercept surveys achieved higher average response rates than phone surveys.

Appendix B. Income guidelines for Lifeline eligibility

Low-income households qualify for Lifeline either by proving eligibility for a qualified federal program or by proving eligibility by having an annual household income less than 135 percent of the FPG. Table B1 lists the current eligibility guidelines based on the income criterion for Lifeline eligibility using US FPG guidelines for the year 2008.

This research classifies respondents as low-income or non-low-income given their reported household size and reported incremental income range. In cases focusing on the eligibility of respondents to qualify for the Lifeline program, low-income households are defined as those who would qualify for Lifeline based on their reported household size and reported income relative to 135 percent of the FPG. These respondents are “presumed eligible” (using the “eligible” classifications in Section 5.4 above). For income data, the survey used the smallest feasible increment to maximize the probability of obtaining a truthful response from the target group of low-income persons: increments of \$10,000 from income of \$0 to income of \$59,999, and larger increments above \$59,999. The survey did not ask respondents to report an exact household income amount, but rather to indicate a range in which their income falls. The advantage of using this approach is that it increases the likelihood of a truthful response to a question that some may consider too private to answer. One drawback of using income ranges is the inability to exactly determine whether a respondent is eligible for Lifeline based on his or her reported income range and household size. For example, a respondent who reported a household size of three and an income range of \$20,000–29,999 is eligible for Lifeline if his income is between \$20,000 and \$23,760, and is not eligible for Lifeline if his income is between \$23,760 and \$29,999. Because the respondent’s exact income is uncertain, this research uses the midpoint of the income range, \$25,000, to determine *presumed* eligibility. In this case, the respondent would be presumed non-eligible for Lifeline since \$25,000 is greater than the maximum income of \$23,760. However, if the respondent had reported a household size of four and an income range of \$20,000–29,999, this respondent would be presumed eligible for Lifeline since \$25,000 (the midpoint of the reported income range) is less than the maximum income for a household of four, \$28,620. Using this approach, the parameters for determining presumed eligibility are as follows:

1. All household sizes with reported income less than \$10,000
2. Household sizes of 2 or more with reported income less than \$20,000
3. Household sizes of 4 or more with reported income less than \$30,000
4. Household sizes of 6 or more with reported income less than \$40,000
5. Household sizes of 8 or more with reported income less than \$50,000
6. Household sizes of 10 or more with reported income less than \$60,000

The probabilities of an incorrect eligibility designation are 10.1%, 11.1%, and 16.7% of total respondents in the landline, mobile, and intercept surveys, respectively, assuming actual incomes are evenly distributed across each income range.³⁵

³⁵ Only for the combinations of household size and income ranges in which an actual Lifeline income cutoff occurs (e.g., a household size of three or four with household income of \$20,000–29,999) does a probability of an incorrect designation exist. Because the occurrence of errors affect a small

Appendix C. Summary statistics of variables used in empirical analysis, 2008

See Table C1 for details.

Table C1

Variable	Landline survey				Mobile survey				Intercept survey			
	Obs.	Mean	Min.	Max.	Obs.	Mean	Min.	Max.	Obs.	Mean	Min.	Max.
Subscribe to Lifeline (1 = yes)	481	0.017 (0.128)	0	1	471	0.021 (0.144)	0	1	181	0.066 (0.249)	0	1
Aware of Lifeline (1 = yes)	489	0.182 (0.578)	0	1	476	0.158 (0.568)	0	1	182	0.434 (0.497)	0	1
Age (in years)	488	51.625 (20.472)	0	98	473	40.129 (16.863)	0	99	206	35.5 (12.917)	18	74
Landline worth (\$)	377	74.528 (155.337)	0	1000	226	63.863 (109.563)	0	1000	154	85.143 (173.257)	0	1000
Own Cell (1 = yes)	487	0.836 (0.371)	0	1	476	1.000 (0.000)	1	1	205	0.771 (0.421)	0	1
Percent total calls with cell	370	49.230 (33.093)	0	100	445	71.960 (30.260)	0	100	151	65.457 (33.506)	0	100
Cell worth (\$)	332	104.907 (177.030)	0	1000	419	127.339 (195.330)	0	1000	152	129.224 (235.419)	0	1000
Own home (1 = yes)	475	0.853 (0.355)	0	1	469	0.571 (0.495)	0	1	202	0.193 (0.396)	0	1
Household number	477	2.583 (1.363)	1	8	475	3.221 (1.996)	1	20	207	3.430 (1.747)	1	12
Black (1 = yes)	489	0.074 (0.261)	0	1	476	0.166 (0.372)	0	1	208	0.452 (0.499)	0	1
White (1 = yes)	489	0.773 (0.419)	0	1	476	0.597 (0.491)	0	1	208	0.279 (0.450)	0	1
Hispanic (1 = yes)	489	0.102 (0.303)	0	1	476	0.204 (0.403)	0	1	208	0.202 (0.402)	0	1
Male (1 = yes)	489	0.364 (0.645)	0	1	476	0.500 (0.501)	0	1	208	0.173 (0.379)	0	1
Education ^a	481	4.331 (1.192)	1	6	464	4.039 (1.209)	1	6	208	3.332 (1.138)	1	6
Household income ^b	357	5.796 (2.613)	1	10	398	5.201 (2.746)	1	10	195	2.179 (1.430)	1	8
Eligible (1 = yes)	357	0.140 (0.348)	0	1	398	0.251 (0.434)	0	1	204	0.917 (0.277)	0	1

^a Less than High School = 1; Some High School = 2; High School Graduate = 3; Some College = 4; College Graduate = 5; Post-Graduate = 6.

^b Less than \$10,000 = 1; \$10,000–19,999 = 2; \$20,000–29,999 = 3; \$30,000–39,999 = 4; \$40,000–49,999 = 5; \$50,000–59,999 = 6; \$60,000–79,999 = 7; \$80,000–99,999 = 8; \$100,000–150,000 = 9; over \$150,000 = 10.

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(footnote continued)

proportion of total respondents, the procedure of classifying respondents as presumed eligible or presumed non-eligible based on reported household sizes and income ranges should not create significant concern.

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