

Reply to Fahimi et al. Comments

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We are extremely pleased Survey Practice provides a forum for authors of papers with conflicting findings to have the opportunity to exchange observations and comments that may facilitate future research, if not an outright resolution of differences. Fahimi and his colleagues say that the results of our paper “are subject to one critical problem and an assortment of secondary issues.” We will attempt to address these critiques below. It is worth noting that Survey Practice submissions are deliberately restricted in length, so some of the items Fahimi found curious are addressed in a longer article that has been submitted for journal publication.

CRITICAL PROBLEM

Fahimi states that: “The main finding of this paper — that the 1+ listed frame covers about 95% of landline households — is based on a contingent result that there are only 87,146,400 residential telephone numbers in the nation. This result is far too low”

We regret that any readers have misinterpreted our attempt to estimate the proportion of residential voice lines included in the 1+ listed frame as an attempt to estimate the total number of landline households, particularly for validation purposes. Our goal was transparency; we recognize our findings conflict with Fahimi’s data and felt a detailed disclosure would help us all to better understand the difference between the two approaches. In order to estimate the proportion of total residential voice landlines in the 1+ banks, we applied our survey estimate of the proportion of landlines in each sample stratum to the universe of banks (and by extension numbers) in each stratum. Then, by adding the total estimated landlines across strata for the denominator of total landlines, we could calculate the proportion (95%) from the 1+ listed banks.

We believe the approach we have outlined in our paper provides for an

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unbiased estimate of the **proportion** of residential voice landlines in listed and unlisted banks. The basic approach is to conduct rigorous interviewer screening of numbers to identify the proportion of **resolved numbers** that can be classified as residential voice lines. Then, the proportion of residential voice lines in the resolved numbers by stratum is applied to the remaining **unresolved numbers** in the stratum to generate an **estimated number of residential voice landlines** by stratum. However, let us consider Fahimi's contention that the estimated number of voice landlines represented in the denominator of our equation (approximately 87.1 million) undermines the validity of our estimates of the proportions by stratum.

We accept Fahimi's estimates that there are approximately 112.4 million households in the United States and approximately 2.5% of these households have no telephones while another 17.5% of these households have cell phones only. Hence, the number of households in the U.S. with residential voice landlines would be approximately 89.9 million (112.4×0.80).

We also agree that the number of residential landlines will be larger than the number of residential households as a result of those households with more than one landline used for voice. However, we believe the current rate of multiple landlines used for voice is much smaller than estimated by Fahimi. Although Fahimi correctly cites 7% of households as having multiple telephone numbers in the Brock-Roth paper, he fails to mention that only 59% of those households had additional residential landline numbers (see Table 1 in that paper). So, the proportion of households with more than one residential landline number appears to have been approximately four percent in that study. It is also important to note that the Brock-Roth paper cited by Fahimi was based on 1999 NHES data. It would certainly not be surprising to find that the proportion of households with multiple voice landlines had declined from 1999 as a result of the growth of cell phones (cell only households) and the decrease in dial-up internet connections. In our study, while we found that 14.7% of households reported more than one phone, most of these were reported as wireless numbers. Actual residential multiple landlines for voice was about 2.4% in our study. So, we would project that the number of residential voice landlines in the United States, today, is probably about 92 million ($112.4 \times 0.80 \times 1.024$) rather than the 97.1 million estimated by Fahimi.

Although it was not our intent to focus on the total estimated number of residential voice landlines, if this was to be the critical test of the validity of the findings, then we would look for validation by some external standard. For example, the FCC Report "Local Telephone Competition: Status as of December 31, 2007" provides the following numbers:

129.7 million incumbent LEC switched access lines,
 28.7 million CLEC switched access lines
 158.4 total switched access lines.

The FCC also estimates the Percentage of Lines Provided to Residential Customers=59%, yielding the result $158,436,758 \times 0.59 = 93,477,687$ residential switched access lines (83% of all households). When you subtract 966,701 for US Territories and Protectorates (counts withheld for CLECs but probably insignificant since suppressed), this translates to 92,907,333 Residential access lines, including households with multiple landline numbers. This falls in the same range of our earlier estimate of 92 million residential voice landlines.

Although we believe that the survey estimate of 87.1 million residential voice landlines is not dramatically different than the FCC based estimate of 92.9 million, it is worth considering why the survey estimate might be lower. First, our estimate of households with voice landlines is based on the resolution of the sample of telephone numbers by an interviewer administered screener. However, in addition to the 2.5% of households with no telephones and 17.5% with cell phones only, the NCHS estimates that there are another 13.3% of households who are **cell phone mostly**, having received all or almost all calls on wireless telephones despite having a landline telephone in the home. Since the cell phone mostly households are less likely or unlikely to answer their landlines, we would anticipate that there will be bias against cell phone mostly households in the interviewer resolved numbers, although they are certainly in the sampling frame.

Second, in order to estimate the total number of residential landlines based on unresolved as well as resolved cases, we assume the residential hit rate in resolved cases would be the same for unresolved cases. We believe that — in the absence of evidence to the contrary — this is a reasonable approach to generating an unbiased estimate across strata. Even if the true household rate is actually lower or higher in the unresolved cases, the result is unbiased so long as it does not behave differently by strata. Although this approach is fine for generating estimates of proportions, if the assumption is incorrect it would affect the total number of estimated households in the individual strata and total. If a disproportionate amount of cell phone mostly cases cannot be interviewer resolved because they never answer their landline, then the household rate would be higher in the unresolved compared to resolved cases, yielding an underestimate of the total number of residential voice landlines. While this may account for some of the difference between our estimated 87.1 million residential voice landlines and an estimated 92.9 million from the FCC figures, it should have no impact on our estimates of proportion by stratum since there is no reason to assume a differential effect by stratum.

While we hoped the use of actual counts from the universe and the samples would facilitate understanding of the basis of our estimates, we acknowledge that the use of reciprocal weights to estimate proportions would have produced the same results without the controversy. Fahimi and his colleagues have the advantage of not providing counts, as distinct from proportions in their Survey Practice article. However, in their AAPOR presentation they applied their

estimated residential rate from their survey to the population of their three strata to yield residential estimates of 16,151,285 in the zero listed, 89,902,643 in the 1+ listed, and 5,615,877 in the remaining POTS. Hence, while we believe the total number of residential landline numbers should be about 92.9 million, the Fahmi study yields a total count of 111.7 million residential landline numbers. So, the apples to apples comparison of the projected number of residential voice landlines for the two studies is 87.1 million in our study and 111.7 million in the Fahimi study, compared to an FCC based estimate of 92.9 million. In addition, Fahimi leaves 4.0% of zero-listed numbers, 2.1% of 1+ listed numbers, and 3.7% of remaining POTS as undetermined, so instead of allocating these numbers between residential and non-residential these cases are effectively treated as non-residential for the estimates. If they were allocated then the Fahimi estimate for total residential voice landline would be even larger.

SECONDARY ISSUES

1. We apologize if we incorrectly inferred the process used by MSG, but we had to guess since it was not documented in either the Survey Practice paper or AAPOR presentation. We would note that what is on the LERG file eventually gets to the TPM file, so these blocks are never permanently excluded. Also given 1000-blocks pooling, considering “all numbers in associated exchanges [as] potentially available for residential assignment” may be a dangerous assumption since many exchanges today mix POTS and non-POTS services. Nevertheless, we included this stratum in our analysis (labeled non-Telcordia), and found that it included less than 1% of eligible residence lines. Most importantly, it represents no impact on the study conclusion because it is already included in the total 5% estimated non-coverage of residential voice landlines for 1+ block samples.
2. As noted above, while the distinction between households and residential landlines is absolutely valid as a unit of measure, since only 2.4% of households with landlines have more than one voice landline, the difference is less critical than it might otherwise be to our estimates. We apologize for any confusion we may have caused by the terminology, which we will correct in any longer publications.
3. The length restrictions for Survey Practice publications limited the degree of detail that we could report for these other objectives. We are providing a copy of the survey questionnaire used to estimate the size, nature and characteristics of households in listed and unlisted banks. We apologize for inferring that MSG interviewers did not determine the household status of numbers dialed by asking respondents directly whether they had reached a household, business, or something else, but they did not provide any

documentation of exactly what was done.

4. As we described in our paper, we also explored a database matching step. We found that the database matching yielded a lower incidence of residential lines for the unresolved cases than resulted from using a simple allocation based on the resolved cases. We chose the allocation because we felt it was based on the superior information gained from the interviewer resolved cases and also provided a higher (more conservative) allocation of residential lines to the unlisted segments.
5. We describe all of objectives of the study in the introduction to this paper. However, restriction on the length of this paper meant that some study objectives, such as the characteristics of households in listed and unlisted banks, could not be addressed in this paper. We hope to publish and present this data in other forums.