UNITED STATES DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. Census Bureau
Washington, DC 20233-0001

2013 AMERICAN COMMUNITY SURVEY RESEARCH AND EVALUATION REPORT MEMORANDUM SERIES ACS13-RER-17

MEMORANDUM FOR ACS Research and Evaluation Advisory Group

From: James B. Treat **(signed on 9/25/2013)**
Chief, American Community Survey Office

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Subject: Effect of Changing Call Parameters in the American Community Survey's Computer Assisted Telephone Interviewing Operation

Attached is the final American Community Survey Research and Evaluation report on the effect of changing call parameters in the American Community Survey's Computer Assisted Telephone Interviewing Operation (CATI). In an effort to reduce respondent burden, we changed specific CATI call parameters in the April 2013 CATI operation. Based on our research, we expected these changes to reduce total CATI call attempts and mean contact attempts per household. We also expected these changes to reduce the number of completed CATI interviews and shift more work into CAPI. This report summarizes the effects of these changes in production, confirming that the loss in interviews and increase in CAPI workloads are in line with our projections.

If you have any questions about this report, please contact Deborah Griffin at (301) 763-2855.

Attachment

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SEPTEMBER 25, 2013

Effect of Changing Call Parameters in the American Community Survey's Computer Assisted Telephone Interviewing Operation

FINAL REPORT

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BACKGROUND

In testimony about the mandatory nature of the American Community Survey (ACS), Congressional staff advocated for their constituents who felt "harassed" due to multiple efforts by the Census Bureau to obtain interviews. In recognition of these concerns, we undertook a series of research projects to assess the potential cost and quality implications of reducing telephone and personal visit contacts with sample households. The first two investigations focused on the Computer Assisted Telephone Interviewing (CATI) operation. One study provided detailed descriptive statistics about the distributions of the number of call attempts and the value of those additional efforts in reducing nonresponse (Zelenak and Davis, 2013). A second study analyzed the existing set of rules (call parameters) that the telephone call centers use in the ACS CATI operation and estimated the potential effect of changes to those parameters (Griffin and Hughes, 2013). Additional research is underway to explore similar aspects of the Computer Assisted Personal Interviewing (CAPI) operation.

Based on the CATI research, starting in April 2013 we implemented changes to the contact rules used in the ACS CATI operation. Those changes reduced the maximum number of total contact attempts and limited the number of unproductive contact attempts. We expect that these changes will reduce total call attempts and mean contact attempts per household. We also expect that these changes will reduce the number of completed CATI interviews and shift more work into CAPI. This report summarizes the effects of these changes in production and allows us to gauge the accuracy of our research-based projections and suggest modifications.

METHODOLOGY

Study Universe

The CATI call parameter changes went into effect starting with the March 2013 sample panel (April CATI data collection). This report summarizes results from the March and April sample panels (April and May CATI data collection months), making comparisons back to the January and February 2013 sample panels (February and March CATI data collection months). All measurements are 2-month means.

Measurements of Changes in CATI and CAPI Workloads

We used the Technologies Management Office (TMO) reports as of the end of CATI closeout of each panel to define the CATI workloads. Appendix A includes the detailed information from these reports. We expect the total CATI and CAPI workloads to vary by month so comparisons of the changes in these workloads have limitations. Selected ratios of outcomes to workloads are included and recognized as better measures.

Griffin and Hughes (2013) chose to focus on a subset of the total CATI and CAPI workloads to estimate reductions in calls and changes in workloads moving into CAPI. Specifically, they restricted their analysis to only those cases that they thought that changes to the CATI call parameters would affect. Subsequent analysis suggests that they excluded some categories of cases that these call parameter changes might affect. Specifically, we found that parameter changes have important effects on cases with a final outcome of "insufficient partial interview," a category considered ineligible in Griffin and Hughes (2013). We expect the projections to understate the effect on the CAPI workloads since some cases (notably some additional insufficient partials) may now flow into CAPI when CATI may have resolved them under the old parameters.

For this analysis, we estimated the change in the total CAPI workload coming from CATI. Given that the average subsampling weight in CAPI is about 33 percent, we estimated the CAPI workload as one-third of the CATI workload that was eligible for CAPI at the conclusion of CATI interviewing. We defined CATI cases that were eligible for CAPI as all CATI outcomes other than completes (outcome = 1, 2, 4, 185), late mail returns (outcome = 174), and sample reduction (outcome = 172).

Measurements of Respondent Burden

For this analysis, we measured respondent burden based on the total number of CATI call attempts (productive or nonproductive) and on the mean number of CATI call attempts per sample case. Here, "sample case" equates to the total CATI workload. Griffin and Hughes (2013) were able to calculate contact attempts for a subset of the total workload, focusing on the universe of cases that we expected the call parameter changes to affect. The production TMO reports cannot make this distinction. This means that we expect the actual reduction in calls to be greater than the estimate in our projections. It also means that to make meaningful comparisons of calls per sample case to our projections we need to consider actual ratios based on several different universes (denominators). To improve the comparisons back to our projections, we calculated three rates based on three alternative universes – all CATI cases, all CATI cases (excluding late mail returns), and all CATI cases that were determined to be eligible for CATI interviewing. Because the rates based on the last two universes include all call attempts in the numerator and only a restricted set of cases in the denominator, we should consider them to represent an upper bound.

Measurements of Quality

To assess the effect of changes in CATI call parameters on quality, we estimated the total number of "lost interviews." Zelenak and Davis (2013) found that it was equally likely that we would obtain a final interview in CAPI for cases that we shifted from CATI into CAPI, leading to a negligible impact on CAPI response rates. Since we select a subsample of CATI nonrespondents for CAPI and complete a high proportion of those interviews in CAPI, we expect that reductions in the CATI response rate have a greater effect on CATI and CAPI workloads and the reliability of survey estimates (total number of completed interviews) than the potential for increasing nonresponse bias in survey estimates.

Given the design of the ACS, there are reliability implications associated with accepting a CATI noninterview when you have a chance of converting it to an interview. We only interview a sample of CATI noninterviews cases in CAPI, which means that if we complete fewer cases in CATI, we send only about 1-in-3 of these noninterviews to CAPI. In addition, cases interviewed in CAPI have higher sampling weights than those interviewed in CATI. Even with similar success rates in completing these interviews in-person, we would lose sample interviews due to subsampling and consequently, increase sampling variability. For this summary, we estimate the reduction in survey total interviews as 2/3 of the reduction in CATI interviews. This is our best estimate of the monthly increase in the number of cases that we did not select in our CAPI sub-sample.

Cost/Benefit and Efficiency Measurements

We do not include cost estimates or a full set of cost/benefit metrics in this report. We restricted our cost/benefit metrics to the ratio of total calls eliminated per lost interview. This ratio reflects the benefit of the reduction in burden relative to the cost of reduction in quality (reliability). As a measure of efficiency, we looked at reductions in login hours overall and as a ratio of various workloads.

LIMITATIONS

The CATI workloads vary each month due to differences in patterns and levels of mail and Internet responses and differences in the number of days of data collection before the identification of the CATI workload. Using the January and February 2013 sample panels as a benchmark introduces unique limitations because of the timing of the January mailings (due to the Christmas holiday period) and the fact that the month of February has the fewest number of days and therefore traditionally results in higher CATI workloads and higher levels of late mail returns. January and February also tend to have higher levels of mail response than other months. For these reasons, we would not expect the March and April panels to align perfectly with January and February, even without parameter changes. Also, the projections in Griffin and Hughes (2013) used a 9-month sample and it is reasonable to expect that a 9-month average could differ from these first 4 months of the year.

In March 2013, the National Processing Center started to phase in audio recording technology to enhance the quality assurance process for all CATI operations. Because the Census Bureau must inform respondents when we may record an interview, we implemented a modification to the introduction script. This modification, requesting permission to record the call, may have influenced respondent cooperation. Unfortunately, this change coincided with the timing of our change in parameters. While we do not anticipate that this change should have any major effect on respondent behavior, it is possible that we could trace some of the differences back to this change in data collection methods, not the parameter change.

RESULTS

CATI and CAPI Workloads

Table 1 includes the mean monthly CATI and CAPI workloads for the January and February panel (pre-change) and the March and April panel (post-change). It includes the initial CATI workload, the total CATI interviews, and the estimated CAPI workload. Due to the very high number of late mail returns (LMRs) in the February panel, I provided two CATI workload comparisons – one based on the full initial workload, the other based on only the non-LMRs in the initial CATI workload.

Table 1. CATI and CAPI Monthly Workloads – 2013 ACS

Source	Pre-change (January/February 2013 panels)	Post-change (March/April 2013 panels)	Difference (Post - Pre)
Initial CATI Workload	96,234	95,086	-1,148
Initial CATI Workload (excluding LMRs)	81,866	81,281	-585
Total CATI Interviews	16,142	14,272	-1,870
CATI cases eligible for CAPI	65,723	67,009	1,286
Estimated CAPI Workload (from CATI)	21,908	22,336	429

Source: TMO CATI Closeout report – May 30, 2013

As expected, the change resulted in a reduction in total CATI interviews and an increase in the CAPI workload coming from CATI. Given the variation in CATI workloads, we calculated CATI interviews and estimated CAPI workloads as percentages of the CATI workloads. Table 2 shows that prior to the parameter change we obtained CATI interviews for about 16.8 percent of the total CATI workload. After the change, this rate fell to 15.0 percent, about a 10.5 percent drop and the workload for CAPI increased by about 3.2 percent. Table 2 also displays these rates based on the CATI workload excluding LMRs.

The earlier CATI research estimated a rate of lost interviews of about 8.8 percent and an increase in the CAPI workload coming from CATI of about 2.8 percent.

Table 2. CATI and CAPI Interviews as Percent of CATI Workloads – 2013 ACS

	Percent of Initial CATI Workload			Percent of Initial CATI Workload (Excluding LMRs)		
Source	Pre-change	Post-change	Percent Change	Pre-change	Post-change	Percent Change
CATI Interviews	16.8	15.0	-10.5	19.7	17.6	-11.0
Estimated CAPI workload (from CATI)	22.8	23.5	3.2	26.8	27.5	2.7

Source: TMO CATI Closeout report – May 30, 2013

Respondent Burden

From the workload, outcome, and call attempt data in Appendix A we can estimate the call attempts per case for various definitions of "cases." As noted in the methodology section, the projections in Griffin and Hughes (2013), focused only on expected changes in CATI calls for a subset of the full CATI universe – those cases eligible to the affected by the parameter changes. This required summing the total call attempts only for the subset of the CATI workload that were eligible for CATI and it therefore excluded calls to ineligible cases (e.g., those with bad phone numbers and LMRs.) That research projected about a 26 percent drop in the number of calls per case for this restricted universe. The TMO reports cannot provide this detail so Tables 3 and 4 include three rates. They all include the same total call attempts in the numerator but include three different denominators.

Table 3 displays the total call attempts before and after the parameter changes and the differences. It also summarizes the three alternative denominators - CATI eligible cases, the initial CATI workload (excluding LMRs), and the initial CATI workload. From those statistics, we derived three sets of estimated CATI call attempts per case. We defined the CATI-eligible universe as all cases other than those with "ineligible for CATI" outcomes in Appendix A. The results show that even under the least restrictive definitions, we achieved about a 22 percent reduction in calls per case, a reduction from about 6.7 calls per case to about 5.2 calls per case. If we restrict the denominator to the eligible cases only, that rate increases to about 31 percent with a drop from about 18.0 calls per eligible case to about 12.5 calls per eligible case. Note that we consider this an inflated estimate as we would expect these ineligible cases to require at least one contact attempt and we could not remove those contact attempts from the total. The projected 26 percent reduction was accurate.

Table 3. Estimated Contact Attempts Per Case for Varying Universe Definitions – 2013 ACS

	Pre-Change		Post-Change		Difference (Post – Pre)	
	Total	Call attempts per case	Total	Call attempts per case	Total	Call attempts per case
Total call attempts	644,839		490,412		-154,427	
CATI-eligible cases	35,847	18.0	39,347	12.5	1,522	-5.3
Initial CATI workload, excluding LMRs	81,866	7.9	81,281	6.0	-585	-1.9
Initial CATI workload	96,234	6.7	95,086	5.2	-1,148	-1.5

Source: TMO CATI Closeout report – May 30, 2013

Quality

Zelenak and Davis (2013) found that CAPI response rates for CATI nonrespondents, even CATI refusals, were very high. For this reason, moving cases out of CATI and into CAPI is unlikely to have a measurable impact on the CAPI or the overall response rates. We do not expect that nonresponse error is likely to increase because of our parameter changes, but we suggest additional research to understand if certain populations may be differentially affected. To assess quality we estimated loss of completed interviews. Griffin and Hughes (2013) projected a monthly loss of about 1,300 interviews after the completion of CAPI based on an 8.8 percent increase in lost CATI interviews. The actual production results are slightly higher than this projection, estimating a 10.5 percent increase in lost CATI interviews each month. This may be due, in part, to the insufficient partials.

Efficiency and Cost/Benefit Analysis

Call parameter changes resulted in a 17.8 percent reduction in the total login hours (a drop of about 4,300 hours.) Table 4 shows the ratios of login hours to total workloads and to completed interviews. After the parameter change, the minutes per CATI workload decreased from 15.2 to 12.6. When we look at the total login hours relative to only the cases that were ultimately completed interviews, the rates drop from 90.3 minutes to 84.0 minutes.

Table 4. Estimated Changes in Total Login Hours – 2013 ACS

	Pre-Change		Post-Change		Difference (Post – Pre)	
	Total	**Minutes per case**	**Total**	**Minutes per case**	**Total**	**Minutes per case**
Total login hours	**24,306**		**19,982**		**-4,324**	
Total CATI workload	96,234	15.2	95,086	12.6	-1,148	-2.6
Total CATI workload, excluding LMRs	81,866	17.8	81,281	14.8	-585	-3.0
Total CATI interviews	16,142	90.3	14,272	84.0	-1,870	-6.3

Source: TMO CATI Closeout report – May 30, 2013

Griffin and Hughes (2013) compared the benefit of reduced contacts with the cost of loss in quality (measured by lost interviews) and estimated that we could eliminate about 56 calls for each lost CATI interview. In this analysis, we found that we eliminated about 83 calls for each lost CATI interview, a higher rate than projected.

CONCLUSION

Despite some limitations in making comparisons between pre-parameter change months and the post-parameter change months, we are able to confirm that we see in production many of the expected outcomes from these changes. Metrics that adjust for the variable CATI workloads allow us to conclude that the changes were successful in reducing respondent burden by reducing total calls by about a factor of 20 to 25 percent. This finding is consistent with our projections and was the primary reason for making this change. We also can conclude that the estimated loss in interviews and increase in CAPI workloads is in line with our projections. At this time, we do not propose any adjustments to these parameter changes and we will continue to monitor the longer-term effects on CATI costs and on the CAPI operation.

REFERENCES

Zelenak, M. and Davis, M. 2013. Impact of Multiple Contacts by Computer-Assisted Telephone Interview and Computer-Assisted Personal Interview on Final Interview Outcome in the American Community Survey. 2013 American Community Survey Research and Evaluation Report Memorandum Series #ACS13-RER-08.

Griffin, D. and Hughes, T. 2013. Analysis of Alternative Call Parameters in the American Community Survey's Computer Assisted Telephone Interviewing. 2013 American Community Survey Research and Evaluation Report Memorandum Series #ACS13-RER-11.

APPENDIX A

CATI Monitoring Report

Reflects closeout of February through May 2013 CATI data collection

	January/February 2013 Panels (Prior to Parameter Change) 2-Month Mean		March/April 2013 Panels (After Parameter Change) 2-Month Mean	
	Number	*Percent of CATI Workload*	Number	*Percent of CATI Workload*
Workloads and Outcomes				
TOTAL Initial CATI Workload	96,234	*100.0*	95,086	*100.0*
Ineligible for CATI - Late Mail/Internet returns (174)	14,368	*14.9*	13,805	*14.5*
Ineligible for CATI - Sample reduction (172)	1	*0.0*	0	*0.0*
Ineligible for CATI - Ineligible – out of scope (20)	628	*0.7*	579	*0.6*
Ineligible for CATI – Invalid number (*see detail below)	43,390	*45.1*	41,355	*43.5*
Completed Interviews (1, 2, 4, 185)	16,142	*16.8*	14,272	*15.0*
Noninterview - Refusals (176, 179, 181)	7,924	*8.2*	8,135	*8.6*
Noninterview - Insufficient Partial (188)	1,900	*2.0*	2,639	*2.8*
Noninterview – Exceeded unproductive call max (183)	8,848	*9.2*	11,237	*11.8*
Noninterview - Language or hearing barrier (24, 25, 191, 192)	102	*0.1*	123	*0.1*
Noninterview - Privacy detector (193)	2,307	*2.4*	2,217	*2.3*
Noninterview – unavailable through closeout (21)	206	*0.2*	203	*0.2*
Noninterview - never contacted, never tried (194, 195 – other outcomes, 199)	418	*0.4*	516	*0.5*
Noninterview - Other (3, 5-15, 175, 177, 182, 186, 198)	3	*0.0*	4	*0.0*
Call Attempts and Hours				
Target Login Hours	27,410	0.28	23,929	0.25
Actual Login Hours	24,306	0.25	19,982	0.21
Actual Call Attempts	**644,839	6.7	490,412	5.2

*Includes FAX, # not in service, #changed, new # needed, Fast/WATTS busy, can't be completed as dialed, no or funny signal, bad connection, temp not in service, wrong # dialed/reached, sample unit not found/unreached/eligibility uncertain (22, 183 – outcome 90, 195 – outcomes 90, 108, 109, 112, 123, 124, 125, 126, 127, 128)

**Estimate derived from actual attempts in March and estimated attempts in February (email from TMO).

Source: ACSO CATI Monitoring Report - May 30, 2013