

Evaluating the Effectiveness of Using an Additional Mailing Piece in the American Community Survey¹

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Abstract

Decreases in response to mail surveys over the years coupled with the costliness of conducting nonresponse follow-up personal interviews has created a need for rethinking the way we have traditionally conducted mail surveys. Despite being a mandatory survey, the American Community Survey (ACS) has not been immune to the recent downturn in mail response rates. As a result, the 2009 ACS additional mailing test determined the feasibility of incorporating an additional reminder postcard versus a third mailed questionnaire to boost the mail response among nonrespondents without known telephone numbers. This test demonstrates that by adding the replacement questionnaire or the reminder postcard we can increase the overall ACS mail response rate by about 1.6 to 1.8 percentage points. This paper describes the test treatments, experimental design, and results of this test.

Key Words: replacement questionnaire, reminder postcard

1. Introduction

The American Community Survey (ACS) is a large national household survey conducted by the U.S. Census Bureau that collects detailed demographic, socioeconomic, and housing information from sample addresses monthly. Approximately three million addresses are sampled each year for the ACS. The ACS uses three modes of data collection to collect data in the following order – mail, Computer Assisted Telephone Interview (CATI), and Computer Assisted Personal Interview (CAPI).

Due to the increased cost of CAPI and the decrease in mail response over the years, we designed a test to identify possible changes to the ACS mailing strategy that might help reduce the cost of CAPI for the ACS by increasing the ACS mail response rate. The 2009 ACS additional mailing test determined the feasibility of incorporating an additional reminder postcard or additional replacement questionnaire to boost the mail response rate for nonrespondents after initial mail attempts for whom the Census Bureau lacks known phone numbers.

2. Methods

2.1 ACS Data Collection Methodology

As mentioned above, the ACS attempts to collect data sequentially starting with mail, followed by CATI follow-up, and finally, for a subsample of cases, by CAPI follow-up. The current mailing strategy for the ACS consists of a pre-notice letter, initial

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questionnaire package, reminder postcard, and a replacement questionnaire if the initial questionnaire was not returned in a timely manner.

Sample cases that do not respond via mail become eligible for our CATI Follow-up operation if we were able to find a phone number for that address through our vendor telephone number look-up operation. Otherwise, those nonresponse cases for which we do not have a known phone number become eligible to be subsampled for CAPI follow-up along with the nonresponse cases from the CATI operation. During the CATI follow-up month, the mail nonrespondents without phone numbers sit dormant for about a month before they are either contacted via CAPI or subsampled out of the ACS.

The cost per case increases as we progress through the different modes of data collection in the ACS. In other words, the more people who return their questionnaires by mail, the cheaper the ACS will be. In 2009, about 42 percent of cases that resulted in a nonresponse to the mail ACS survey did not have a telephone number and became eligible to be subsampled for the more expensive personal visit. As a result, this universe contributes to a higher per case cost, larger variances in the estimates, and sample loss (due to subsampling for the CAPI follow-up).

2.2 Motivation for the 2009 ACS Additional Mail Test

Decreases in response to mail surveys over the years (de Leeuw 2002, National Academy of Sciences, 1995) coupled with the costliness of conducting personal visit nonresponse follow-up has created a need for rethinking the way we have traditionally conducted mail surveys. Decreases in mail response rates lead to increases in the nonresponse followup workloads and have the potential to reduce the reliability of survey estimates. Despite being a mandatory survey, the ACS has not been immune to the recent downturn in response to mail surveys. Reviewing the ACS mail response rates, starting in 2002 we observe decreases in the mail response rate each subsequent year ending in 2007 (Castro, 2008).

Based on evidence of the rising cost of CAPI interviews and the decreasing trend in mail response rates over the years, we designed a test to identify possible changes to the ACS mailing strategy that would help reduce the cost of CAPI for the ACS by increasing the ACS mail response rate. The 2009 ACS additional mailing test determined whether incorporating an additional reminder postcard or an additional mailed questionnaire could increase the mail response rate for nonrespondents without known telephone numbers.

2.3 Cognitive Testing of Materials

Prior to conducting the additional mailing test, we first developed three additional mailings for our target population: two postcards and a revised cover letter. One postcard used a “carrot” approach, the other used a “stick” approach, and the new letter used both approaches. The “carrot” approach provided the respondent with a friendly message that attempted to appeal to their sense of civic duty by highlighting community resources and services that may benefit from their participation in the ACS. The “stick” approach provided a more formal and stern message appealing to the respondents’ sense of authority, by emphasizing that participation in the ACS is required by law.

Cognitive testing was then conducted to test the wording of the messages, respondents’ reactions to them, and to determine which of the two postcards would go forward into the split-panel test with the revised replacement questionnaire package cover letter. The two new reminder postcards were printed on 5.5” x 8.5” cardstock. The cardstock chosen

was larger in size than the 4.25" x 6" cardstock currently used for the ACS reminder postcard to help the postcard stand out in a pile of mail. We compared cognitive testing participants' reactions to the three materials and their rankings in terms of personal likeliness to respond. Results showed that the stick approach elicited very strong reactions - most said they would complete and send immediately, but others would refuse to participate at all (Schwede, 2008).

In addition to testing the proposed content of the additional mail materials, cognitive testing also elicited feedback on different color schemes for the postcard – salmon color, green, and white. Respondents tended to prefer the green colored postcard due to its brightness, readability, and ability to be noticed (Schwede, 2008). Based on the cognitive testing results, the large green postcard format was chosen in conjunction with a combined approach of using “carrot” and “stick” language for the content of the final postcard and revised cover letter. Both the postcard and the letter included the Telephone Questionnaire Assistance (TQA) 1-800 telephone number to allow respondents to seek assistance or provide their information over the phone. See Figures 1 and 2 in the appendix for a facsimile of the final postcard and revised cover letter.

2.4 Selection Criteria

As a minimum criterion for considering whether to change the ACS mailing strategy, the cost savings produced from the additional mailing needed to be large enough to cover the operational and material cost for the selected additional mailing method. If both additional mailing methods met this criterion, then the method that resulted in the greater increase in mail response would be selected for inclusion in the production mailing strategy.

2.5 Sample Design

All cases in the ACS March 2009 production sample were randomly assigned to one of the three additional mailing treatment groups (control, postcard only, or replacement questionnaire), prior to identifying the additional mailing test universe. The additional mailing test universe included 60,755 cases (out of 227,435 mailable ACS sample addresses). These cases had no telephone numbers and were identified as mail nonresponse cases as of approximately two weeks after the mailout of the first replacement questionnaire on March 30 (just prior to the start of CATI follow-up). We excluded from the additional mailing test universe any cases where both the first and second questionnaire mail packages were returned as Undeliverable as Addressed (UAA) by the United States Postal Service (USPS). Cases where only the first or second mail package was returned as UAA were included in the universe since the production ACS data show that some of these cases result in a mail response. Note that group quarters, Puerto Rico, and remote Alaska were excluded from the test universe.

The “pre-assigning” of the production cases into the two treatment groups and control group resulted in a similar number of cases among the three groups once the nonrespondents without telephone numbers were identified ($n_{control} = 20,273$, $n_{postcard} = 20,417$, and $n_{questionnaire} = 20,065$).

3. Limitations

This evaluation does not address the impact on the reliability of the ACS estimates that would result if there are increases in the number of mail responses due to the introduction

of the additional mailing pieces. The decreases in sampling variance that would result from these additional mailings are due to two factors: (1) The increase in the total number of interviews and (2) A decrease in the proportion of sample interviews coming from CAPI with the largest sampling weights. In other words, any reduction in the CAPI workload resulting from the receipt of additional mail responses increases the effective sample size of the ACS and the precision of the estimates.

The figures in this report are subject to error arising from various sources, including sampling error and non-sampling error. All comparative statements in this report have undergone statistical testing, and, unless otherwise noted, all comparisons are statistically significant at the 10 percent significance level.

4. Research Questions and Results

4.1 Does changing the ACS mailing strategy to include an additional reminder postcard or replacement questionnaire increase the mail return rate among nonrespondents without known telephone numbers?

The mail return rate for each treatment is essentially the percent of addresses, determined to be deliverable by the USPS in the additional mailing test universe within a given treatment, that returned a nonblank questionnaire by mail or responded via the Telephone Questionnaire Assistance (TQA) program. To calculate the mail return rate for each treatment, we define the numerator as all test cases that responded by calling the ACS TQA telephone number or by returning a nonblank first or second mailed questionnaire (or third questionnaire, if part of the third questionnaire treatment group) on the date of, or prior to, when the nonresponse cases are identified for CAPI. Note that both the postcard and letter included the toll-free TQA telephone number to allow respondents to call in and provide their data. The denominators for each mail return rate are all test cases belonging to their respective treatment excluding unmailable cases and cases where both the first and second questionnaire mailing were returned as UAA by the USPS prior to June 1, 2009 (the date when data collection ended for the March 2009 production panel). Note that the denominator includes addresses that could later have been determined to be vacant or ineligible.

Table 1 shows the mail return rates for each additional mail treatment weighted up to the national level. The control group, which received no additional mail materials, had a mail return rate of 15.2 percent. This means that about 15 percent of the mail nonresponse cases with no additional contacts responded by mail anyway. Members of the control group that respond by mail or by calling in to the TQA number are essentially late responders. That is, they fail to respond prior to the date at which we create the address file for the additional mailing universe, but decide to respond thereafter. For the group that received an additional reminder postcard, we observed a mail return rate of 21.3 percent and a mail return rate of 22.1 percent for those that received an additional questionnaire replacement package with our modified cover letter.

Table 1. Test Universe Mail Return Rates for the Control, Postcard, and Questionnaire Treatment Groups

Treatment	Estimate (%)	Standard Error (%)
Control	15.2	0.3
Postcard	21.3	0.4
Questionnaire	22.1	0.3

Source: 2009 American Community Survey,
www.census.gov/acs/www/SBasics/desgn_meth.htm

Comparing the treatments among each other, Table 2 shows that sending an additional reminder postcard or an additional replacement questionnaire boosts the mail return rate for this universe in comparison to the case where we do nothing. Specifically, the additional reminder postcard resulted in a 6.1 percentage point increase over the control group and the additional replacement questionnaire resulted in an increase of 7.0 percentage points over the control group in the study universe.

While the replacement questionnaire appears to have produced a higher mail return rate than the reminder postcard, the data do not provide any evidence of a difference that is statistically significant between the postcard and questionnaire.

Table 2. Differences in the Test Universe Mail Return Rates Among the Control, Postcard, and Questionnaire Treatment Groups

Treatment Comparison	Estimate (%)	Standard Error (%)	Significant*
Postcard – Control	6.1	0.5	Yes
Questionnaire – Control	7.0	0.4	Yes
Questionnaire – Postcard	0.9	0.5	No

Source: 2009 American Community Survey,
www.census.gov/acs/www/SBasics/desgn_meth.htm

*Note that for this family of one-sided hypothesis tests, the familywise error rate has been controlled using the Bonferroni multiple comparison method at the $\alpha = 0.10$ level.

4.2 Does changing the ACS mailing strategy to include an additional reminder postcard or replacement questionnaire increase the overall ACS mail response rate?

In addition to looking at the impact of the additional mailings among households without known phone numbers, we were also interested in the impact of the additional mailings on the overall ACS mail response rate for the entire March 2009 production sample.

Following the specifications for calculating the official ACS mail response rate as described by Cepietz (2009), we calculated the overall ACS mail response rates for each treatment group prior to and after the additional mailing. The mail response rate differs from the mail return rate, as it is the ratio of mail and TQA responses to the mailable sample addresses that the Census Bureau ultimately determined to be occupied. UAAs are not taken into account, but units determined to be vacant or nonexistent are removed from the denominator, resulting in a more precise measure of the effect on mail response from addresses that were eligible to respond by mail.

Table 3 shows the changes in the ACS mail response rates for the control and additional mail treatment groups between March 30 (the date when we mailed out the additional mailing pieces) and the end date for the data collection period for the March panel (June 1). For the control group, we observe a 14.2 percentage point increase in the response rate as measured before and after the additional mailings. For the additional mailing treatment groups, we observe a 15.9 percentage point increase for the postcard and a 16.1 percentage point increase for the questionnaire.

Table 3. Change in the Overall ACS Mail Response Rate for the Control, Postcard, and Questionnaire Treatment Groups (Pre- and Post-Additional Mailing)

Treatment	Estimate (%)	Standard Error (%)
Control	14.2	0.2
Postcard	15.9	0.2
Questionnaire	16.1	0.2

Source: 2009 American Community Survey,
www.census.gov/acs/www/SBasics/desgn_meth.htm

Based on statistical testing, Table 4 shows that in comparison to the control group, the additional reminder postcard leads to a 1.6 percentage point increase in the overall ACS mail response rate and the additional replacement questionnaire leads to 1.8 percentage point increase in the overall ACS mail response rate. However, the data provide no evidence that the increases due to the postcard and questionnaire are significantly different from each other.

Table 4. Differences in the Change in the Overall ACS Mail Response Rate Among the Control, Postcard, and Questionnaire Treatment Groups

Treatment Comparison	Estimate (%)	Standard Error (%)	Significant*
Postcard - Control	1.6	0.2	Yes
Questionnaire - Control	1.8	0.2	Yes
Questionnaire - Postcard	0.2	0.2	No

Source: 2009 American Community Survey,
www.census.gov/acs/www/SBasics/desgn_meth.htm

*Note that for this family of one-sided hypothesis tests, the familywise error rate has been controlled using the Bonferroni multiple comparison method at the $\alpha = 0.10$ level.

4.3 Does changing the ACS mailing strategy to include an additional reminder postcard or replacement questionnaire reduce the CAPI follow-up workload?

From our previous comparative analysis of the mail response among treatments, with the increase in response due to the additional mailing, we would expect the number of cases sampled to be included in the CAPI follow-up workload to decrease for the additional mailing treatment groups. The only workload changes should be in the test universe – the mail nonrespondents without telephone numbers.

For each additional mailing scenario (no additional mailing, an additional reminder postcard, or an additional replacement questionnaire), we calculate an estimate of the

expected portion of the total CAPI workload for the March 2009 production ACS sample that is attributed to the universe of mail nonrespondents without known telephone numbers. We calculate this estimate for a given treatment by taking the actual CAPI workload for the treatment and adjusting it upward to account for the fact that each treatment is only about one-third of the total CAPI workload. This adjustment factor is the simple ratio of the total number of mail nonresponse cases without a known phone number (60,755) to the total number of mail nonresponse cases without a known phone number assigned to a given treatment group ($n_{control} = 20,273$, $n_{postcard} = 20,417$, and $n_{questionnaire} = 20,065$).

$$Expected\ CAPI\ Workload_t = (Actual\ CAPI\ Workload_t) \times \left(\frac{60,755}{n_t} \right), \text{ where } t \text{ is the treatment}$$

Table 5 shows that for the control group of the March 2009 ACS sample, approximately 19,000 cases are in the CAPI workload because they are mail nonresponse cases without a known phone number. Under both scenarios with an additional mailing, the estimated CAPI workload contribution is reduced to approximately 18,000 cases.

Table 5. Estimated CAPI Workloads for the Control, Postcard, and Questionnaire Treatment Groups

Treatment	Estimate	Standard Error
Control	19,264	162
Postcard	18,235	159
Questionnaire	18,110	161

Source: 2009 American Community Survey,
www.census.gov/acs/www/SBasics/desgn_meth.htm

Given that no other changes in mail response are expected, the differences among the workloads are estimates of the impact on the overall CAPI workload from changing the mail implementation strategy. When we perform the multiple comparison tests using the Bonferroni method (Table 6), we find that both the additional mailing of a reminder postcard and an additional replacement questionnaire significantly decrease the CAPI workload compared to that of the control group by approximately 1,000 cases. However, the data provide no statistical evidence of a superior additional mailing method for reducing the CAPI workload when we compare both additional mail methods to each other.

Table 6. Differences in the CAPI Workloads Among the Control, Postcard, and Questionnaire Treatment Groups

Treatment Comparison	Estimate	Standard Error	Significant*
Control – Postcard	1,029	227	Yes
Control – Questionnaire	1,154	228	Yes
Postcard - Questionnaire	125	226	No

Source: 2009 American Community Survey,
www.census.gov/acs/www/SBasics/desgn_meth.htm

*Note that for this family of one-sided hypothesis tests, the familywise error rate has been controlled using the Bonferroni multiple comparison method at the $\alpha = 0.10$ level.

5. Conclusion

The 2009 ACS additional mailing test tested the effectiveness of incorporating an additional reminder postcard or an additional replacement questionnaire to boost mail response for nonrespondents without known telephone numbers. We demonstrated that by adding either an additional replacement questionnaire or an additional reminder postcard we can increase the ACS mail response rate for the universe of nonrespondents without telephone numbers by about 6 to 7 percentage points. Furthermore, we demonstrated that the additional mailings boost the overall ACS mail response rate by about 1.6 to 1.8 percentage points.

While both additional mailing methods improve the mail response rate compared to the control group, we need to ensure that the expected cost savings from the increase in mail response will cover the operational and material cost of implementing these mailings. Not surprisingly, the postcard costs significantly less to implement than the questionnaire given that the questionnaire is much more expensive to print, assemble, and mail.

Based on itemized cost information from this experiment, if we send an additional reminder postcard, the reduction in the CAPI workload that we observe translates into a large enough cost savings to offset the operational and material cost associated with this method. If we opt to send an additional replacement questionnaire, the reduction in CAPI workload that we observe is not large enough to offset the operational and material cost associated with this method.

As a result of a potential cost expenditure using the additional questionnaire, we recommend implementing the additional reminder postcard in the production ACS mailing strategy. The additional reminder postcard is slated to be introduced into production ACS starting in January 2011.

Further evaluation is needed to quantify the benefits in reliability due to the increase in response. Given the positive results of the additional mailing test, we hope that through continued innovations in mail data collection methods, such as providing an additional mailing, we can continue to combat the recent trends in declining response to mail surveys as well as reduce the cost of expensive nonresponse followup operations used to supplement mail surveys.

References

- Castro E. (2008). "American Community Survey and Puerto Rico Community Survey: Margins of Error for the 2000-2007 Housing Unit Response Rate by Mode" 2008 American Community Survey Sampling Memorandum Series #ACS08-S-20.
- Cepietz, E. (2009). "Specifications for Calculation of American Community Survey and Puerto Rico Community Survey Housing Unit Mode Level Response Rates" 2009 American Community Survey Sampling Memorandum Series #ACS09-S-25. (Draft)
- de Leeuw, E. (2002). "Trends in Household Survey Nonresponse: A Longitudinal and International Perspective." In *Survey Nonresponse*, ed. Robert M. Groves, Don A. Dillman, John L. Eltinge, and Roderick J. A. Little, pp. 41-54. New York: Wiley.
- National Academy of Sciences (1995). *Modernizing the U.S. Census*. Edmonston, B. and Schultze, C. eds. National Academy Press, Washington, D.C.
- Schwede L. (2008). "'Carrot' or 'Stick' Approach to Reminder Cards: What Do Cognitive Respondents Think?" 2008 JSM Proceedings of the Section on Survey Research Methods – AAPOR paper, pp 4352-4359.
- U.S. Census Bureau (2009). *Design and Methodology American Community Survey*, U.S. Government Printing Office, Washington, DC.

Appendix: Additional Mailing Materials Images

Figure 1. Postcard

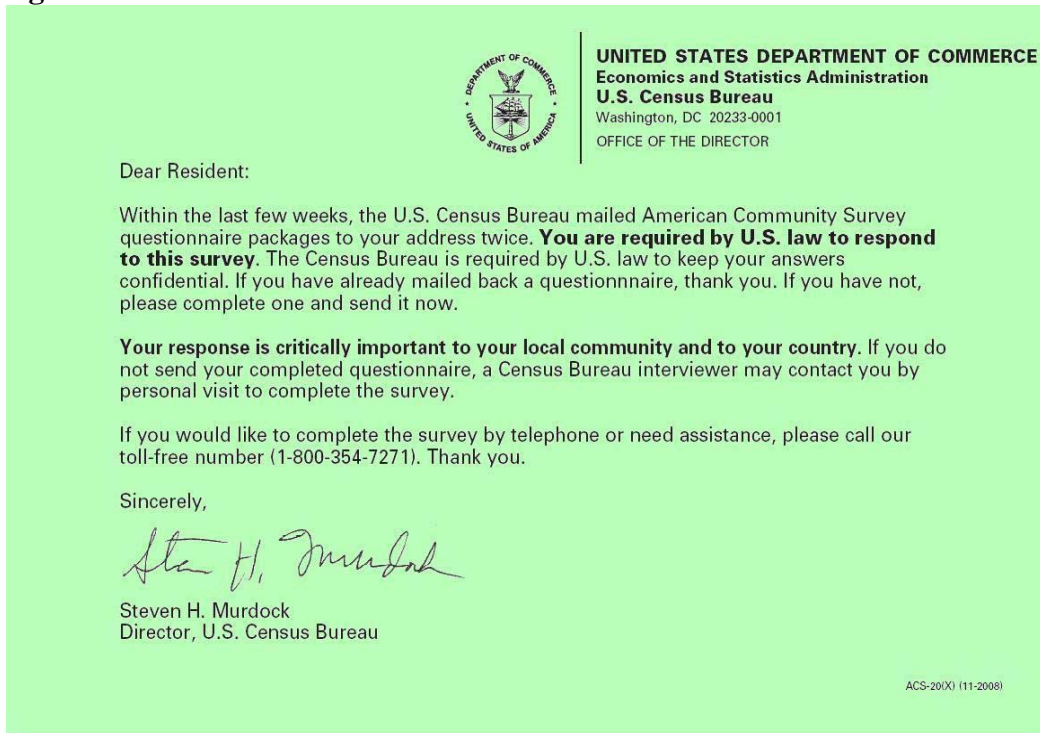




Figure 2. Modified Cover Letter for the Additional Replacement Questionnaire

	<p>UNITED STATES DEPARTMENT OF COMMERCE Economics and Statistics Administration U.S. Census Bureau Washington, DC 20233-0001 OFFICE OF THE DIRECTOR</p>
<p>Dear Resident:</p> <p>Within the last few weeks, the U.S. Census Bureau mailed American Community Survey questionnaire packages to your address twice. We asked you to help us with this very important survey by completing a questionnaire and mailing it back, but we have not received one yet. If you have already mailed a questionnaire back, thank you very much. If you have not, please complete one and send it now.</p> <p>We have enclosed another copy of the questionnaire with this letter. This survey is so important that a Census Bureau interviewer may contact you by personal visit if we do not receive your completed questionnaire.</p> <p>Your response is critically important to your local community and to your country. By answering these questions, you help provide local and national leaders with the information they need for planning schools, hospitals, and other community services. The information is also used to develop programs to reduce traffic congestion, provide job training, and plan for the healthcare needs of the elderly.</p> <p>The Census Bureau chose your address, not you personally, as part of a randomly selected sample. You are required by U.S. law to respond to this survey. The Census Bureau is required by U.S. law to keep your answers confidential. The enclosed brochure answers frequently asked questions about the survey.</p> <p>If you would like to complete the survey by telephone or need assistance, please call our toll-free number (1-800-354-7271). You can also use the enclosed guide if you need help filling out the questionnaire. Thank you.</p> <p>Sincerely,</p> <p></p> <p>Steve H. Murdock Director</p> <p>Enclosures</p>	
<p style="font-size: small;">ACS-14(L)(X)M3 (1-2009)</p> <p style="text-align: center;">U S C E N S U S B U R E A U <i>Helping You Make Informed Decisions</i></p> <p style="text-align: right; font-size: small;">www.census.gov</p>	