Testing Mail Notification Strategies for an Internet Response Option in the American Community Survey[1]

Michelle Ruiter, Mary Frances Zelenak, Mary C. Davis,
Rachel Horwitz, and Jennifer Guarino Tancreto
U.S. Census Bureau, 4600 Silver Hill Road, Washington D.C. 20233

Abstract
The American Community Survey (ACS) is an on-going monthly survey that collects demographic, social, economic and housing information about the people and housing units in the United States and Puerto Rico using three sequential modes of data collection –mail, telephone and personal visit. The U.S. Census Bureau initially contacts households by mail to inform them about the ACS and provide the paper questionnaire. Later, telephone calls and personal visits are used to contact nonrespondents. In response to the cultural shift in communication from paper to electronic modes, the U.S. Census Bureau tested the use of an Internet response option for the ACS during the April 2011 mail collection period. The focus was on testing different strategies for informing households about the Internet response option and encouraging response by using variations of the current mail materials and methods. The strategies included changes to the messages on the current letters and questionnaires, the addition of a new informational postcard and modifications of the current mailing schedule. This paper will discuss the results of the April 2011 Internet test, specifically the impact of the different strategies on self-response, as well as recommendations for future testing.

Key Words: Internet data collection, American Community Survey, Notification strategies

1. Introduction

The American Community Survey (ACS) is an ongoing survey designed to provide communities with reliable and timely demographic, social, economic and housing data every year. The ACS collects data in every U.S. county and, as of April 2011, had an annual sample of about three million addresses allocated into twelve monthly samples of approximately 250,000 addresses each.[2]

Currently, the ACS collects data using three modes—mailout/mailback of a paper questionnaire, Computer-Assisted Telephone Interview (CATI) and Computer-Assisted Personal Interview (CAPI). Sampled addresses receive the mail questionnaire first and are later contacted via CATI and then CAPI[3] as part of a nonresponse follow-up to mail. In April 2011, the U.S. Census Bureau conducted the 2011 ACS Internet Test to evaluate the feasibility of providing a fourth response mode—an Internet response option—to respondents in the ACS. The main objective of this test was to determine the best way to present the Internet response mode in the ACS mailing pieces to maximize self-response.

[1]This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress. Any views expressed on statistical, methodological, technical, or operational issues are those of the authors and not necessarily those of the U.S. Census Bureau.
[2]Beginning in June 2011, the annual sample size was increased to 3.54 million addresses.
[3]Mail and CATI nonrespondents are subsampled prior to inclusion in the CAPI operation.

2. Background

In 2000, the ACS tested the use of the Internet as an alternative response mode. Researchers found that offering the Internet as a response option during the mail phase actually decreased the overall response rate and that very few respondents completed the questionnaire on the Internet (Griffin *et al.*, 2001). Since 2000, technological advances have been instrumental in the trend toward becoming a paperless society. Internet use has become more common as people use it for shopping, financial transactions, gathering information and general communication. In the survey world, declining response rates as well as the benefits of using an automated mode (such as speed, built-in quality checks and lower processing costs) have inspired survey organizations to investigate the use of the Internet for data collection.

Previous Internet experiments have shown mixed results with respect to response rates. Some studies found an increase in response from offering an Internet response choice (Schneider *et al.*, 2005), while others found simply a shift in response (from mail to Internet) rather than an increase (Brady *et al.*, 2004). In addition to the Griffin *et al.* study noted above, Smyth *et al.*, (2010) and Gentry *et al.* (2008) also saw a decrease in response rates as a result of offering respondents a choice between responding by mail or Internet.

This emerging pattern of decreasing response in the presence of response mode choices is puzzling. One might expect that more choices would provide opportunity for respondents to choose their preferred mode. There is a growing theory that respondents may become overwhelmed by response mode choices and ultimately choose none. Others speculate that the transition from a mail survey invitation to an Internet response might require people to place the invitation aside until they are online and ultimately they forget about the task.

Given the decrease in response shown in the 2000 ACS Internet Test and mixed results from other studies, it is important to test the impact of an Internet response option on response before introducing this new mode into ACS production.

3. Methodology

The April 2011 ACS Internet Test is one of two ACS Internet tests conducted in 2011 that were designed to evaluate the feasibility of providing a fourth response mode, Internet, to addresses sampled for the ACS. The main objective of these two tests was to determine the best way to present the Internet response mode in the ACS mailing pieces to maximize self-response. The results of this first test aided in the design of the second test, the November 2011 ACS Internet Test, and the results from that test will help make the ultimate decision of what method will go into ACS production.

The April 2011 ACS Internet test took place in April and May 2011, and was designed to test introducing a web response option in the mail month of data collection for the April ACS production sample. Thus, most metrics presented in this paper are based on responses received by the end of the first month (April), which is the mail data collection month.

3.1 Experimental Treatments

We tested different strategies for notifying sampled households about the Internet response mode using combinations of the five ACS mailing pieces (pre-notice letter, initial questionnaire mailing, reminder postcard, and for nonrespondents only, replacement questionnaire mailing and additional reminder postcard). Two of the notification strategies involved providing a concurrent choice between a paper questionnaire and Internet survey. Two other strategies pushed households to use the Internet by removing the paper questionnaire in the first mailing. These "Push" strategies could potentially introduce cost savings. If successful in maintaining or increasing response, these strategies could save costs associated with printing the questionnaire, postage, data capture of paper questionnaires, and reduced volume of replacement mailings due to faster and higher levels of response.

Prominent Choice -- Sampled addresses received survey questionnaires and households were given a concurrent choice of completing the ACS on paper or the Internet. The Internet option was prominently displayed in both the cover letter and questionnaire in the initial mailing package, as well as on the reminder postcard, in the replacement questionnaire mailing and on the additional reminder postcard. This strategy also included a new Internet instruction card in both the initial and replacement questionnaire packages that provided the choice of response modes (paper or Internet).

Not Prominent Choice -- These sample addresses also received a survey questionnaire but the Internet response option appeared only in a non-prominent place on the front of the questionnaire. No other mail materials mentioned the online option, and the Internet instruction card was not provided. The purpose of testing this strategy was to provide the Internet option to those who were looking for it while attempting to alleviate a respondent's tendency to do nothing when offered response mode choices as seen in previous studies (Millar *et. al.*, 2011; Griffin *et. al.*, 2001).

Push Internet on Regular Mailing Schedule -- In the Push Internet strategy, sampled addresses only received a letter and instruction card on how to complete the ACS on the Internet. The letter mentioned the benefits of using the Internet to respond, and the instruction card provided all of the information they would need to access the survey. Sampled addresses did not receive a paper questionnaire until the replacement questionnaire mailing (sent to nonrespondents only) about three weeks later. The paper questionnaire included the same prominent display of the Internet option on the form and in the cover letter that was used in the Prominent Choice (described above). The mailing sequence followed the same timing as ACS production.

Push Internet on Accelerated Mailing Schedule -- This strategy used the same concept as the previous Push strategy except that the replacement questionnaire was mailed earlier (about two weeks after the initial mailing compared to about three weeks in the regular schedule) to give nonrespondents a mail questionnaire option sooner than the other Push strategy.

Control (Mail only) -- The Control was the April 2011 ACS production sample panel. These sampled addresses received a paper questionnaire. There was no Internet option for the Control cases.

3.2 Stratification

Based on previous research, we suspect that the likelihood of using the Internet will differ by the characteristics of the housing units (Lugtig *et al.*, 2011; Guarino, 2001; U.S. Department of Commerce, 2010). Therefore, we aimed to study the effect of the notification strategies among households that we expected to be more/less likely to use the Internet. We stratified the sample for this test so we could consider targeting the notification strategies in ACS production to different segments of the population if we found one treatment to be more successful in a specific stratum. To accomplish this goal, we stratified census tracts into two strata: Targeted and Not Targeted. The Targeted stratum consisted of tracts containing households that we expected to use the Internet at a higher rate based on past research. The remaining tracts were included in the Not Targeted stratum. About one-third of the ACS universe fell in the Targeted stratum, while two-thirds fell in the Not Targeted stratum.

We crossed the four experimental notification strategies listed above with the two strata to create eight experimental treatment panels. We also stratified the Control (mail only) group, the April 2011 ACS production sample panel, for a total of ten treatments. Each experimental treatment group had a sample of 15,000 addresses resulting in a total of 120,000 sample addresses selected specifically for the experiment and roughly 230,000 mailable sample addresses from ACS production for the control. The experimental treatment samples were equally allocated to the two strata, resulting in an oversample of addresses for the Targeted stratum. The Control (mail only) contained a proportional allocation to the two strata, as it is fully representative of the sample universe.

This test was designed to simulate a typical one-month mail data collection period in the ACS. There were no CATI or CAPI nonresponse follow-up operations for the experimental treatments, but the Control included nonresponse follow-up since it was the ACS production sample. We decided to keep the online survey available beyond the first month so we could see whether we would get more visits or return visits from the experimental treatment cases after we typically would have started nonresponse follow-up by CATI. Most of the analysis in this study is limited to the first month of data collection, before the Control cases were sent to CATI nonresponse follow-up, since we do not know what the effect of the CATI operation would have been on the experimental treatment cases.

3.3 Analysis Design

In advance of the test, we identified a series of research questions (discussed in Section 4) to help assess the success of the various notification strategy treatments. The analysis for each of these research questions was conducted separately for the Targeted and Not Targeted strata.

We used a three-step method for comparing the notification treatments to maximize the testing power for each research question. In Step 1, we compared the two Choice strategies (Not Prominent and Prominent) to each other, and the two Push strategies (Regular and Accelerated schedule) to each other. In Step 2, we compared the Choice strategy winner to the Push strategy winner from Step 1. In Step 3, the winner between Push and Choice was compared to the Control. Note that the winners were determined based on specific evaluation measures for each research question. In the event that the treatments were not significantly different at any step in the process, the treatment with the most desirable rate was selected as the winner. At times, we extended the statistical testing to make comparisons between the Control and another treatment of interest.

4. Results

While any test of an Internet response option presents numerous items for analysis, our main focus in this test was the effect of providing an Internet response option on the overall self-administered response rates. Besides these rates, we looked at related items to get an overall picture of the effects of the new response mode and to gauge potential cost savings: Internet usage, access, and break-off rates, item nonresponse rates, and demographic profiles of respondents by mode and treatment. Again, we conducted the analyses separately for each stratum to determine which notification strategy treatment performed best in each stratum.

4.1 Does offering an Internet response option change the total self-administered (including mail and Internet) response rate?

The self-administered response rate is the percent of all sampled addresses[4] that provided a non-blank mail, Internet or Telephone Questionnaire Assistance[5] (TQA) response. Current ACS operations consider a form to be non-blank even if there is only minimal information provided, specifically, a phone number or name of a household member. Thus, some Internet cases which broke off before completing the survey are still considered responses in these rates.

Also, both mail and Internet responses may ultimately be deemed not complete enough to be processed, so the self-administered response rates may be slightly inflated. However, from 2008 to 2011, only about 0.2 percent of mail responses were deemed not complete enough. (U.S. Census Bureau, 2012).

The rates presented in this report are different from the mode-specific and overall survey response rates that ACS publishes since we do not know the eligibility status of the addresses in the sample without personal visit follow-up, and thus we cannot remove vacant or nonexistent units from the denominator.

Table 1 contains the self-administered response rates for each treatment and Control by stratum. These rates indicate the amount of self-response received at the time when we would normally transition to nonresponse follow-up by CATI, after the first month of data collection (April 28, 2011). The table also includes the percent of sampled cases that responded by Internet. Table 2 contains statistical testing of the total self-administered response rate according to the three-step process identified in Section 3 for both strata for the same time period.

[4] The sample was selected only from mailable cases.

[5] The TQA process allows respondents to call a toll-free number to receive help or complete the survey. TQA responses are included with mail responses because they usually occur during the mail data collection month.

Table 1. Self-Administered Response Rates and Internet Response Rates (excluding Internet break-offs that were insufficient partials) by Notification Strategy and Stratum (through April 28, 2011)

Stratum	Notification Strategy				
	Control (Mail only)	Prominent Choice	Not Prominent Choice	Push Regular	Push Accelerated
Targeted					
Response Rate	38.1	38.1	37.5	29.9	39.6
(SE)	(0.2)	(0.4)	(0.4)	(0.3)	(0.4)
INT Response Rate	N/A	9.6	3.4	27.5	27.0
(SE)		(0.2)	(0.2)	(0.3)	(0.4)
Not Targeted					
Response Rate	29.7	30.2	29.7	19.0	29.3
(SE)	(0.2)	(0.4)	(0.3)	(0.4)	(0.4)
INT Response Rate	N/A	6.1	2.0	16.4	16.7
(SE)		(0.2)	(0.1)	(0.3)	(0.3)

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011

Table 2. Differences in Self-Administered Response Rates (excluding Internet break-offs that were insufficient partials) by Notification Strategy and Stratum (through April 28, 2011)

	Compare Choice Strategies		Compare Push Strategies		Compare Best Choice and Best Push		Compare Best Strategy and Control	
Stratum	Difference (Prom - Not Prom)	Best	Difference (Reg - Accel)	Best	Difference (Choice - Push)	Best	Difference (Best - Control)	Best
Targeted								
Estimate	0.5	Prom	-9.7*	Push	-1.5*	Push	1.5*	Push
(SE)	(0.5)		(0.6)	Accel	(0.6)	Accel	(0.5)	Accel
Not Targeted								
Estimate	0.5	Prom	-10.2*	Push	0.9	Prom	0.5	Prom
(SE)	(0.5)		(0.5)	Accel	(0.6)	Choice	(0.4)	Choice

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011
* Indicates statistical significance at $\alpha<0.1$, controlling for multiple comparisons.

Offering the choice between Internet and mail, regardless of how prominently that choice was advertised, achieved self-response rates that were very similar in both strata. The difference between Prominent Choice and Not Prominent Choice was not significant in either stratum. This result is very positive considering the substantial decrease in self-response we experienced when we provided a choice between modes in the 2000 ACS Internet test (Griffin *et al.*, 2001). As expected, more cases responded by Internet in the Prominent Choice compared to the Not Prominent Choice.

Both Push treatments achieved high rates of Internet response, as compared to the Choice treatments. However, we found that the total self-response rates for the Push Accelerated treatments were significantly higher than the rates for the Push Regular treatments, in both strata. Comparing the two Push strategies shows that moving the mailing of the paper questionnaire to nonrespondents up by one week was the key to the success of the Push Accelerated strategy in both strata. Moving this mailing up allowed more time for mail returns to be received before we typically begin the next stage of data collection (nonresponse follow-up by CATI). The regular ACS operational schedule, as implemented in the month of April 2011, only provided a seven-day window between mail out of the paper form to nonrespondents and the time when we typically begin CATI nonresponse follow-up. This is not enough time for households that are receiving the paper form for the first time to return a response. In fact, if we look at response rates for

the Push Regular and Push Accelerated treatments 14 days after we mailed out the paper questionnaire to nonrespondents (May 5th and April 28th, respectively), the rates are in the same range as we would expect. Thus, the Push Regular treatment is simply at a disadvantage because of the ACS operational schedule for the month of April 2011.

Surprisingly, in Targeted areas, self-response rates for the Push Accelerated strategy were significantly better than those for the Prominent Choice and Control (by 1.5 percentage points each). This is the first test where the Census Bureau has seen a push strategy perform well in a household survey. Moreover, the majority of households in the Push Accelerated treatment used the Internet to respond.

Perhaps the most unexpected finding was the strong performance of the Push Accelerated strategy in Not Targeted areas. Self-response rates were not significantly different from the rates from the Choice strategies or the Control.[6] Similar to Targeted areas, the majority of response in the Push Accelerated treatment came from Internet.

We did not conduct CATI nonresponse follow-up on cases in the experimental treatments in this test (Control cases were included in CATI starting May 1, 2011). However, we did send the fifth mailing piece, the additional mailing postcard, to households that did not respond by mail or Internet, and for which we could not find a phone number.[7] These cases typically receive the postcard instead of a CATI call early in the second month of data collection. (For this test, the mailing date was May 5, 2011.) There were no remaining self-response rate differences among the strategies in the Targeted stratum[8] at the end of the second month of data collection. The Prominent Choice treatment had significantly higher self-response at the end of the data collection period than the Push Accelerated treatment in the Not Targeted stratum. Again, these rates do not simulate the rates we would expect if the treatment cases had gone to CATI nonresponse follow-up.

4.2 Are the Internet usage rates statistically different by notification strategy?

In Table 1 above, we displayed the percent of sampled households that used the Internet to respond. The Internet usage rate is a related measure that shows the percent of all responses that came from Internet by the end of the first month of data collection (Table 3). We expected that the Prominent Choice treatment would have more Internet response than the Not Prominent Choice since the message about the mode choice was featured in that treatment. We also anticipated that the Push treatments would gain more Internet response than the Choice treatments because we did not provide a paper questionnaire until a few weeks into the data collection period. We compared the percent of responses that came from Internet across the treatments in Table 4.

[6] Though not reflected in Table 2, the Push Accelerated strategy was tested against Control in the Not Targeted stratum, and the difference was not statistically significant.

[7] Households that accessed the Internet, but did not provide enough data to be considered a sufficiently complete response were mailed the additional postcard. Internet respondents who provided a sufficiently complete response were excluded from this postcard mailing.

[8] The self-response rate for the Control (mail only) at the end of the data collection period was significantly higher than the experimental treatments due to the fact that CATI nonresponse follow-up calls resulted in some mail returns (experimental treatment cases did not go to CATI).

Table 3. Internet Usage Rates by Notification Strategy and Stratum (through April 28, 2011)

Stratum	Notification Strategy			
	Prominent Choice	Not Prominent Choice	Push Regular	Push Accelerated
Targeted				
INT Usage Rate	25.7	9.4	92.0	69.1
(SE)	(0.6)	(0.4)	(0.4)	(0.6)
Not Targeted				
INT Usage Rate	20.6	6.9	86.5	57.9
(SE)	(0.6)	(0.4)	(0.6)	(0.7)

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011

Table 4. Differences in Internet Usage Rates by Notification Strategy and Stratum (through April 28, 2011)

	Compare Choice Strategies		Compare Push Strategies		Compare Best Choice and Best Push	
Stratum	Difference (Prom - Not Prom)	Best	Difference (Reg - Accel)	Best	Difference (Choice - Push)	Best
Targeted						
Estimate	16.3*	Prom	23.0*	Push Reg	-66.4*	Push Reg
(SE)	(0.7)		(0.8)		(0.8)	
Not Targeted						
Estimate	13.8*	Prom	28.6*	Push Reg	-65.8*	Push Reg
(SE)	(0.7)		(0.9)		(0.9)	

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011
* Indicates statistical significance at $\alpha<0.1$, controlling for multiple comparisons.

As expected, there were significantly more Internet responses in the Prominent Choice compared to the Not Prominent Choice in both strata. In fact, the Internet usage rate for Prominent Choice was more than twice as high as the rate in Not Prominent Choice. Although the difference in Internet usage between the Choice treatments is large, it is encouraging that seven to nine percent of response came from Internet in the Not Prominent treatment since we only advertised the online option on the paper questionnaire in a subtle fashion. We chose to advertise on the questionnaire because we have observed in cognitive testing that respondents tend to focus on the questionnaire and disregard the other materials in the mailing.

We also found that significantly more responses came from Internet in the Push treatments than the Choice treatments in both strata, by approximately 40 to 65 percentage points. In fact, the majority of responses in both Push treatments came from Internet in both strata. The motivation behind the Push treatments was to drive response to the Internet to the extent possible, and certainly, the Push approach was successful in doing that.

The Push Regular treatment appears to have a greater proportion of Internet response than the Push Accelerated at the time we would identify the CATI nonresponse follow-up universe, but this difference is confounded by the fact that overall response is much lower in the Push Regular treatment (due to the lack of mail returns).

4.3 Did the rate of accessing the Internet instrument and subsequent break-offs differ among notification strategies?

We wanted to study response behavior surrounding the online survey. To do this, we computed three different measures: the percent of sampled units in each treatment that accessed the online survey by the end of the second month of data collection (May 2011);

the percent of those that accessed the survey but never reached the end of the survey (break-off); the percentage of those that broke off the online survey who ultimately returned a paper questionnaire.

Table 5. Internet Access Rates, Break-off Rates, and Percent of Break-offs that Returned a Mail Form by Notification Strategy and Stratum (through May 31, 2011)

Stratum	Notification Strategy			
	Prominent Choice	Not Prominent Choice	Push Regular	Push Accelerated
Targeted				
Accessed	12.4	4.4	32.3	30.9
(SE)	(0.3)	(0.2)	(0.3)	(0.4)
Break-off	12.3	10.2	17.0	16.9
(SE)	(0.7)	(1.1)	(0.5)	(0.6)
Break-offs with mail return	12.7	20.9	11.7	10.2
(SE)	(2.3)	(5.0)	(1.1)	(1.1)
Not Targeted				
Accessed	7.9	2.5	19.6	19.0
(SE)	(0.2)	(0.1)	(0.3)	(0.3)
Break-off	13.0	12.8	17.6	16.9
(SE)	(0.9)	(1.7)	(0.7)	(0.7)
Break-offs with mail return	11.1	12.5	15.2	13.1
(SE)	(2.4)	(4.9)	(1.3)	(1.5)

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011

Table 6. Differences in Internet Access Rates, Break-off Rates, and Percent of Break-offs that Returned a Mail Form by Notification Strategy and Stratum (through May 31, 2011)

	Compare Choice Strategies		Compare Push Strategies		Compare Best Choice and Best Push	
Stratum	Difference (Prom - Not Prom)	Best	Difference (Reg - Accel)	Best	Difference (Choice - Push)	Best
Targeted						
Accessed	8.0*	Prom	1.4*	Push Reg	-19.9*	Push Reg
(SE)	(0.3)		(0.6)		(0.5)	
Break-off	2.1	Not Prom	0.1	Push Accel	-6.7*	Not Prom
(SE)	(1.3)		(0.7)		(1.2)	
Break-offs with mail return	-8.2	Not Prom	1.5	Push Reg	9.2	Not Prom
(SE)	(5.4)		(1.4)		(5.2)	
Not Targeted						
Accessed	5.4*	Prom	0.6	Push Reg	-11.8*	Push Reg
(SE)	(0.3)		(0.4)		(0.4)	
Break-off	0.1	Not Prom	0.8	Push Accel	-4.0*	Not Prom
(SE)	(2.0)		(1.0)		(1.8)	
Break-offs with mail return	-1.4	Not Prom	2.1	Push Reg	-2.7	Push Reg
(SE)	(5.3)		(2.0)		(4.9)	

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011
* Indicates statistical significance at $\alpha<0.1$, controlling for multiple comparisons.

As expected, significantly more households accessed the online survey in the Prominent Choice treatment compared to the Not Prominent Choice treatment due to the differences in how we advertised the Internet option. Similar to the Internet usage rates presented in Table 3, we also found that a much higher percent of households accessed the Internet survey in the Push treatments than the Choice treatments in both strata, Targeted and Not Targeted. The Push Regular treatment had a significantly higher access rate than the Push Accelerated in the Targeted stratum.

Next, we turned our attention to the break-off rates. The rates are within the scope of what we have seen in other studies (Peytchev, 2009; Griffin *et al.*, 2001; Bentley *et al.*, 2011). We did not observe any differences in break-off rates between the two Choice treatments or between the two Push treatments in both strata. We did find, however, that significantly more households broke-off in the Push treatments compared to the Choice treatments. We were not surprised by this finding. Most households that were pushed to use Internet did not see the paper questionnaire in advance of starting the online survey, so they may not have expected the length or content of the survey when attempting to respond.[9] Also, it is possible that respondents whom we pushed towards using the Internet may have not been comfortable using the technology, which may have also led to the increased break-off rates.

Looking across treatments, approximately 10 to 20 percent of the Internet break-offs ended up returning a mail form. We plan to look at these cases closer in future research so we can determine what factors caused them to abandon the Internet survey and eventually respond by mail. There were no significant differences in the rate of break-offs returning a mail form across the treatments.

4.4 How do item nonresponse rates differ between Internet and mail responses as well as notification strategies?

The purpose of this analysis was to study question-level response behavior between the two data collection modes and notification strategies. We first explored item nonresponse across mail (excluding Control) and Internet returns to compare the completeness of the returns by mode. These rates were computed on raw, pre-edited data, so they do not reflect final ACS item nonresponse rates.

We found that the questions in the later part of the questionnaire (detailed person section) were much more likely to suffer from item nonresponse on the Internet than mail. In fact, item nonresponse rates for topics like place of birth, educational attainment, language spoken at home, and disability that appear in that section of the questionnaire were about double the rates for the mail responses. We did find, however, that Internet item nonresponse rates were better than the rates for mail responses in the earlier sections of the questionnaire (basic demographic and housing questions).

[9] Most Internet response in the Push treatments came in before the paper questionnaire was mailed to nonresponding households.

Table 7. Item Nonresponse Rates for Selected Questions by Mode and Stratum (for Households that Responded by April 28, 2011; standard errors in parentheses)

	Targeted		Not Targeted	
Variable	Internet (excl. Insuff. Partials)	Mail	Internet (excl. Insuff. Partials)	Mail
Basic Demographic Questions				
Age/Date of Birth	0.7 (0.1)	0.9 (0.1)	0.5** (0.1)	1.1 (0.1)
Sex	0.1** (0.0)	2.2 (0.1)	0.2** (0.0)	2.6 (0.1)
Relationship	0.0** (0.0)	0.6 (0.1)	0.0** (0.0)	0.8 (0.1)
Hispanic Origin	0.4** (0.1)	4.6 (0.2)	0.3** (0.1)	6.6 (0.3)
Race	0.4** (0.1)	1.9 (0.1)	0.3** (0.1)	2.6 (0.2)
Housing Questions				
Type of Building	0.1** (0.0)	1.2 (0.1)	0.0** (0.0)	2.0 (0.2)
Number of Rooms	0.6** (0.1)	2.1 (0.1)	0.4** (0.1)	3.2 (0.2)
Number of Vehicles	0.8** (0.1)	1.5 (0.1)	0.8** (0.1)	2.0 (0.2)
Food Stamps	0.7** (0.1)	1.8 (0.1)	0.8** (0.1)	2.6 (0.2)
Tenure	0.6** (0.1)	3.5 (0.2)	0.7** (0.1)	4.7 (0.2)
Detailed Person Questions				
Place of Birth	8.7* (0.3)	4.0 (0.2)	9.1* (0.4)	5.7 (0.3)
Educational Attainment	8.4* (0.3)	5.5 (0.2)	8.9 (0.4)	8.0 (0.3)
Speak Another Language	8.6* (0.3)	4.9 (0.2)	9.0* (0.4)	6.9 (0.3)
Health Insurance	9.8* (0.3)	4.6 (0.2)	10.1* (0.4)	6.5 (0.3)
Difficulty Hearing	9.7* (0.3)	4.5 (0.2)	10.1* (0.4)	6.3 (0.3)
Work Last Week	8.1* (0.3)	5.6 (0.2)	8.5* (0.3)	7.5 (0.3)

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011
* Indicates that mail is statistically significantly lower than Internet at $\alpha<0.1$.
** Indicates that Internet is statistically significantly lower than mail at $\alpha<0.1$

Mail cases trend towards having more item nonresponse in the Not Targeted stratum than in the Targeted stratum. The Internet cases, on the other hand, do not show the same trend between the Targeted and Not Targeted strata. This may suggest that using Internet has some benefit for item nonresponse in the Not Targeted stratum.

Our focus thus far has been on comparing Internet and mail responses, but we also wanted to study the item nonresponse rates for the treatments since they contain a blend of Internet and mail responses. Table 8 contains item nonresponse rates for each treatment.

As Table 8 shows, item nonresponse rates for each treatment, particularly among the detailed person questions, are impacted by the amount of Internet response in that treatment. Ninety-two percent of responses in Push Regular (in Targeted) are from Internet so the item nonresponse rates for that treatment are most affected by the Internet break-offs that are considered sufficiently complete, followed by Push Accelerated (of which, 69 percent is Internet response in Targeted). The Not Prominent Choice treatment, where Internet response is only nine percent in Targeted, was least affected by the Internet break-offs.

Table 8. Item Nonresponse Rates for Selected Questions by Notification Strategy (excluding Internet break-offs that were insufficient partials) (for Households that Responded by April 28, 2011; standard errors in parentheses)

	Targeted					Not Targeted				
Variable	Control (mail only)	Not Prom Choice	Prom Choice	Push Reg	Push Accel	Control (mail only)	Not Prom Choice	Prom Choice	Push Reg	Push Accel
Basic Demographic Questions										
Age/DOB	0.8 (0.1)	0.7 (0.1)	0.8 (0.1)	0.7 (0.1)	0.9 (0.1)	1.1 (0.0)	0.9 (0.1)	0.9 (0.1)	0.6 (0.2)	0.8 (0.1)
Sex	2.2 (0.1)	1.9 (0.1)	1.6 (0.1)	0.2 (0.0)	0.8 (0.1)	2.5 (0.1)	2.4 (0.2)	1.9 (0.2)	0.4 (0.1)	1.1 (0.1)
Relationship	0.6 (0.0)	0.5 (0.1)	0.5 (0.1)	0.0 (0.0)	0.3 (0.1)	0.8 (0.0)	0.8 (0.1)	0.6 (0.1)	0.1 (0.0)	0.3 (0.0)
Hispanic Origin	4.1 (0.1)	3.5 (0.2)	3.5 (0.2)	0.7 (0.1)	1.9 (0.2)	5.9 (0.1)	5.6 (0.3)	5.2 (0.3)	0.9 (0.2)	2.8 (0.3)
Race	1.9 (0.1)	1.6 (0.1)	1.5 (0.1)	0.5 (0.1)	0.8 (0.1)	2.5 (0.1)	2.4 (0.2)	2.1 (0.2)	0.4 (0.1)	1.1 (0.1)
Housing Questions										
Type of Building	1.4 (0.1)	0.8 (0.1)	0.9 (0.1)	0.2 (0.1)	0.6 (0.1)	2.4 (0.1)	1.3 (0.2)	1.6 (0.2)	0.4 (0.1)	1.4 (0.2)
Number of Rooms	2.3 (0.1)	1.7 (0.2)	1.7 (0.2)	0.9 (0.1)	1.2 (0.2)	3.3 (0.1)	2.8 (0.3)	2.5 (0.2)	0.6 (0.1)	2.1 (0.3)
Number of Vehicles	1.7 (0.1)	1.1 (0.1)	1.6 (0.2)	0.8 (0.1)	1.0 (0.1)	2.4 (0.1)	1.6 (0.2)	1.8 (0.2)	1.0 (0.2)	1.4 (0.2)
Food Stamps	1.7 (0.1)	1.6 (0.2)	1.4 (0.2)	0.9 (0.1)	1.0 (0.1)	2.5 (0.1)	2.3 (0.2)	2.1 (0.2)	1.1 (0.2)	1.7 (0.2)
Tenure	3.3 (0.1)	2.9 (0.2)	3.0 (0.2)	0.8 (0.1)	1.5 (0.2)	4.7 (0.1)	4.1 (0.3)	3.9 (0.3)	1.3 (0.2)	2.5 (0.2)
Detailed Person Questions										
Place of Birth	3.2 (0.1)	3.6 (0.2)	5.0 (0.3)	9.1 (0.4)	8.2 (0.4)	5.2 (0.1)	5.5 (0.3)	5.8 (0.3)	9.5 (0.5)	8.7 (0.5)
Educational Attainment	4.7 (0.1)	4.9 (0.3)	6.1 (0.3)	8.9 (0.4)	8.4 (0.4)	7.5 (0.1)	7.6 (0.4)	7.6 (0.4)	9.5 (0.6)	9.3 (0.5)
Speak Another Language	4.0 (0.1)	4.3 (0.3)	5.7 (0.3)	9.0 (0.4)	8.5 (0.4)	6.4 (0.1)	6.4 (0.3)	6.9 (0.4)	9.5 (0.6)	9.1 (0.5)
Health Insurance	3.7 (0.1)	4.3 (0.3)	5.7 (0.3)	10.3 (0.4)	9.2 (0.4)	5.9 (0.1)	6.2 (0.4)	6.5 (0.4)	10.6 (0.6)	9.8 (0.5)
Difficulty Hearing	3.7 (0.1)	4.2 (0.2)	5.7 (0.3)	10.1 (0.5)	9.0 (0.4)	5.8 (0.1)	5.8 (0.3)	6.6 (0.4)	10.5 (0.6)	9.8 (0.5)
Work Last Week	4.7 (0.1)	4.7 (0.2)	6.1 (0.3)	8.7 (0.4)	8.2 (0.4)	7.0 (0.2)	7.1 (0.4)	7.2 (0.5)	9.1 (0.5)	8.8 (0.5)

Source: U.S. Census Bureau, 2011 American Community Survey Internet Test, April to May 2011

4.5 Are there differences in the demographics of Internet respondents and mail respondents? Across notification strategies?

Previous studies have shown that the characteristics of Internet respondents differ from those of mail respondents (Brady et al., 2004; Guarino, 2001; Lesser, 2010). We wanted to see if differences in demographic characteristics of Internet respondents and mail respondents suggested differences in self-selection into response modes.

For each stratum, we grouped together all Internet respondents regardless of notification strategy. We did the same for mail respondents across strategies (excluding control panel production cases since they did not have the option to use the Internet). We then statistically compared selected demographic characteristics between Internet respondents and mail respondents to see if there were differences that may be due to respondents' self-selection into a mode. For the person-level items, we used the characteristics of the first person listed in the household roster (Person 1) to classify the household, although we know from past studies that Person 1 is not always the respondent (Hill *et al*., 2008; DeMaio *et al*., 1990).

Compared to mail respondents, Internet respondents in both strata were more likely to be younger, female, Asian, other race, with higher education, and more likely to speak a language other than English at home. We also found that Internet respondents were less likely to be Black. Some of these demographic trends are evident in previous studies as well; particularly, age and education have often been correlated with Internet use (Lugtig et al., 2011; Guarino, 2001). We also saw that Internet respondents tend to live in larger households than mail respondents. In the Targeted stratum only, Internet respondents were more likely than mail respondents to be non-White and Hispanic.

We also looked at the demographic profiles of responding households across the notification treatments. We included all persons within the responding households for this analysis. We did not do any significance testing between estimates since we were trying to identify trends rather than measure any specific differences. The characteristics of households in the two Choice treatments and the Control appear to be close in range. The Push Accelerated characteristics are in line with those of the Choice and Control treatments, except that Push Accelerated responding households appear to be younger and more educated, likely due to heavy Internet use in that treatment.

While we observed some demographic trends, we are not overly concerned about the impact of the Internet mode on the respondent pool at this stage in the data collection. First, while it is the basis for these comparisons, mail data collection alone does not provide an accurate representation of the characteristics of ACS survey respondents (Joshipura, 2008). We still have nonresponse follow-up operations in CATI and CAPI to help ensure proper demographic representation.

5. Summary

The Push Accelerated strategy seems to provide many benefits. First, it increased the response rate by 1.5 percentage points over Control in the Targeted stratum, and maintained the response rate in the Not Targeted stratum, at the time we would normally cut for nonresponse follow-up by CATI. In both strata, most of the response in Push Accelerated came from Internet returns. We know Internet returns come in more quickly

than mail returns. However, we also found that Internet break-offs are harmful to the item nonresponse rates, particularly in the detailed person section of the questionnaire. Therefore, we have to research the best way to handle the cases that break off in the Internet instrument. In November 2011, we fielded a follow-up ACS Internet test based solely on the response rate results from the April 2011 test. The results from the follow-up test will help determine which notification strategy to use when we introduce an Internet response option in ACS production, starting with the January 2013 panel.

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