

2010 Census Deadline Messaging and Compressed Mailing Schedule Experiment¹

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Abstract

The purpose of this experiment was to determine if an increase in census mail response and speed of response could be realized (without decreasing data quality) by including a due date or deadline message on various mailing pieces and/or by sending the census mailing pieces closer to Census Day. Panel 1, the Control panel, was mailed according to the production 2010 Census schedule and did not display any due dates or deadline messages. Panels 2 through 5 examined the main effects of four deadline messaging treatments mailed according to the production 2010 Census schedule. Panel 6, the Compressed Schedule panel, was used to evaluate the main effect for the compressed schedule treatment, without an explicit deadline. Under the compressed mailing schedule, the advance letter, initial questionnaire package, and reminder postcard were moved to one week later to reduce the length of time between the mailing and Census Day. Finally, Panels 7 through 10 combined each deadline messaging treatment with the compressed schedule. More research needs to be conducted, but it is evident that deadline messages can improve response without negatively impacting data quality.

Key Words: deadline message, compressed schedule, deadline, compressed, due date

1. Introduction

The primary goal of the Self-Response Options research program for the 2010 Census was to review, develop, and test ways to improve overall cooperation rates and data quality for the mailout/mailback universe. One option was to include a due date or deadline message on various mailing pieces with the intent of increasing response rates and the speed of responses. The results of academic studies on the use of a deadline have been mixed (for a positive effect see Henley, 1976; for no effect see Fox, Crask, & Kim, 1988), but most of these studies were conducted decades ago and the results may not be applicable to today's survey environment.

One component of the 2003 National Census Test (NCT) tested the inclusion of a due date on the initial questionnaire package. The hypothesis was that a due date might invoke a sense of urgency or importance in the respondent, which might lead to an increase in self-response rates. While the inclusion of a due date on the outgoing envelope of the initial questionnaire mailing package did not affect the overall cooperation rates, it did increase the speed of the mail response (Bouffard, Brady, & Stapleton, 2004). Speedier response is beneficial because it can reduce the number of replacement questionnaires that are sent to nonresponding households. It can also reduce the eventual Nonresponse Followup (NRFU) workload by ensuring that responses are processed earlier. Testing a deadline message was also planned for both the 2004 Census Test and 2006 Census Test, but was eventually excluded due to budget constraints.

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.

Deadline messaging was tested again as part of a small multi-purpose test in the 2006 Decennial Short Form Experiment. In that test, deadline messaging was evaluated in conjunction with a compressed mailing schedule. Under the compressed mailing schedule, the first three stages of the four-stage mailing process (advance letter, initial questionnaire package, reminder postcard, and replacement questionnaire package) were moved to one week later. The initial questionnaires were mailed 14 days before Census Day (rather than the standard 21-day mailing schedule for that test) with a deadline four days after Census Day. The impetus behind using a compressed schedule is that the production schedule may result in a disconnect for some respondents between the instructions to complete and return the form “today” and the April 1 reference date, which may be two weeks (or more) later than when they receive the form. Hence, a compressed schedule reduces the length of time between the mailing and Census Day.

The results showed that the combined effect of a compressed mailing schedule with deadline messaging yielded higher response rates without negatively impacting data quality (Martin, 2009). There was also evidence of within-household coverage improvement. However, the test was not able to separate the effects of the deadline messages from the compressed schedule nor was it able to analyze the speed of mail returns.

The 2010 Census Deadline Messaging and Compressed Mailing Schedule Experiment was designed to determine if the 2006 Decennial Short Form Experiment results held (and to what magnitude) within the context of a decennial census environment, where media events, advertising, partnership programs, and generally an increased awareness of the census could have impacted the likelihood of a household returning their census form. In addition, the 2010 experiment used a design that enabled the analysis of the main effects of the deadline messaging and compressed schedule treatments, as well as the impact on speed of response. Results from this study can be used to improve the wording and timing of the mailing pieces for future censuses and surveys.

2. Methodology

2.1 Panel Design

The effects of deadline messaging and a compressed mailing schedule on mail return rates was evaluated through the use of ten panels as part of the 2010 Census Program for Evaluations and Experiments (CPEX). For the deadline messaging panels, the due dates and messages were displayed on the advance letter, cover letter of the initial questionnaire, outgoing envelope of the initial questionnaire mailing package, and the reminder postcard. Each of the advance letters displayed the same deadline message, with the panel differences occurring in the initial questionnaire mailing packages and the reminder postcards. The replacement questionnaire mailing package did not contain any of the deadline messages because they were sent out after the due date that was referenced in the deadline messages. (Sample households received census questionnaires with content identical to the production 2010 Census questionnaire.) Table 1 provides a summary description of these ten panels.

Table 1. Deadline Messaging (DM) and Compressed Schedule (CS) Panel Design

Panel	Treatment
1 Control	No deadline message. Mailed according to the production 2010 Census mailing schedule.
2 Mild DM	Tested a “mild” set of deadline messages that simply indicated the date by which the form should be mailed back (April 5, 2010). Mailed according to the production 2010 Census mailing schedule.
3 Progressive DM	Tested a “progressive” set of deadline messages that used stricter and progressively more urgent wording that emphasized the “deadline” date and provided a reminder that census response is required by law. Mailed according to the production 2010 Census mailing schedule.
4 NRFU DM	Tested a nonresponse followup or “NRFU” motivation set of deadline messages that were similar to the mild messages in the first panel, but also informed residents that a census interviewer would come to their house if the form was not returned. Mailed according to the production 2010 Census mailing schedule.
5 Cost Savings DM	Tested a “cost savings” set of deadline messages that used a strategy of reminding people that sending back their forms on time saves money.
6 CS	Production 2010 Census materials mailed on a “compressed schedule.” That is, the advance letter, initial questionnaire mailing package, and reminder postcard were all slightly delayed, to reach the respondent closer to Census Day.
7 Mild DM + CS	Combined “mild” set of deadline messages along with the compressed mailing schedule.
8 Progressive DM + CS	Combined “progressive” set of deadline messages along with the compressed mailing schedule.
9 NRFU DM + CS	Combined “NRFU” set of deadline messages along with the compressed mailing schedule.
10 Cost Savings DM + CS	Combined “cost savings” set of deadline messages along with the compressed mailing schedule.

The Control panel (Panel 1) was mailed according to the 2010 Census schedule and did not display any due dates or deadline messages.

Panels 2 through 5 examined the main effects of the four deadline messaging treatments. These panels were mailed according to the production 2010 Census schedule, but had a due date displayed on each of the mailing pieces. The due dates and messages were displayed on the advance letter, cover letter, and outgoing envelope of the initial questionnaire mailing package, as well as the reminder postcard. Refer to the Appendix for the actual deadline message wording at each mailing.

Martin (2009) noted that it would not be practically feasible to implement a due date without also compressing the schedule since a deadline too far in the future would not make sense. However, there was further interest in studying the use of a deadline without changing the schedule, as was done in the 2003 NCT. Thus, Panel 6 was used to evaluate

the main effect for the compressed schedule treatment, without any explicit deadlines. This allowed us to determine the impact of a tighter schedule centered closer to Census Day, without instituting a firm due date on respondents. Table 2 compares the in-home delivery mailing dates for the production 2010 Census schedule with the dates for the experimental compressed schedule.

Table 2. In-home Delivery Dates for Production Schedule and Compressed Schedule

	Production Schedule	Compressed Schedule
Advance Letter	March 8 - March 10	March 15 - March 17
Initial Questionnaires	March 15 - March 17	March 22 - March 24
Reminder Postcard	March 22 - March 24	March 29 - March 31
Census Day	April 1	April 1
Replacement Questionnaires	April 6-10*	April 6-10

*The 2010 Census included targeted and blanket replacement strategies; The target replacement questionnaires were delivered April 6-10 while blanket replacement questionnaires were delivered April 1-3. All CPEX experimental panels used the target replacement strategy.

Finally, Panels 7 through 10 combined deadline messaging with the compressed mailing schedule, as previously described.

2.2 Mailing Strategy

The mailing strategy for the deadline messaging and compressed schedule panels was similar to the regular 2010 Census mail strategy. Each sampled household was mailed an advance letter, an initial questionnaire, and a reminder postcard.

All of the sample households were included in the target replacement mailing operation, in which households that had not responded by a pre-determined date received a replacement questionnaire. This differed from the production 2010 Census system, in which the replacement strategy was divided into three groups based on an area's anticipated mail response: no replacement, target replacement delivered to households that had not responded by the cutoff date, or blanket replacement to all households. The treatments for this experiment are presumably correlated with response propensity. Therefore, the 2010 Census replacement strategy, which was determined by response propensity, was not feasible for these experimental panels. In addition, all experimental panels were exposed to the same replacement mailing strategy in order to maintain comparability of stratum results. This target replacement strategy is more realistic for the 2020 Census since the three-tiered design was only implemented for the 2010 Census to alleviate operational concerns.

2.3 Sample Design

The sample design for this experiment focused on stratifying based on an area's response propensity. We used the areas as delineated by the 2010 Census replacement mailing strategy in which high response areas did not receive a replacement mail form; medium response areas received a target replacement mailing to nonrespondents as of a certain date; and low response areas received a blanket replacement mailing to all housing units, regardless of their response status (See Zajac & Letourneau, 2008 for further details on the identification of the replacement mailing housing units). We used this stratification since it partitions by response propensity, which is a key measure for our experimental treatments. Although we selected our sample based on the delineation of the 2010 Census replacement mailing strategy, as stated earlier, all nonrespondents in this experiment received a target replacement mailing.

The experimental sample was only selected from mailout/mailback enumeration areas in the 50 U.S. states and the District of Columbia. Thus, results can be generalized to only the mailout/mailback universe.

The target size for this sample was 20,000 housing units per panel (Bentley, 2009) with approximately 5,000 housing units in the “High Response Stratum,” 5,000 housing units in the “Medium Response Stratum,” and 10,000 housing units in the “Low Response Stratum.” The sample allocation for these panels utilized a substantial oversampling because there was greater benefit in improved response for harder-to-count areas and we wanted to be certain that we could effectively measure any such improvements for that stratum. Actual sample sizes varied due to the incremental sampling scheme necessitated by the iterative address frame development². The final sample size was just over 18,000 housing units per panel (Compton, 2009) with the “High Response Stratum” being slightly more than target, the “Medium Response Stratum” being less than target and the “Low Response Stratum” being less than target. It is likely that these differences were primarily due to a shift in the universe for the final replacement area delineations compared to the original estimates, which were based on operational restrictions and data available at that time.

2.4 Evaluation Measures

We conducted a variety of analyses in order to evaluate the success of the deadline messaging and compressed mailing schedule treatments. All ten panels were evaluated based on return rates, speed of return, item nonresponse, and public reaction.

An additional analysis was conducted for all panels to determine whether the use of a deadline message and/or a compressed schedule affected overall coverage. We examined the average household count, both before and after editing/imputation, to determine what effect, if any, the compressed schedule had on the population count. We also analyzed the proportion of households sent to Coverage Followup³ by panel and source of coverage improvement.

2.4.1 Return Rates

Mail return rates were the primary analytical measure used to evaluate the success of the deadline messaging and compressed mailing schedule treatments. Return rates are a measure of cooperation and indicate if housing units in one panel are more, or less, likely to respond than those in another panel. Return rates were calculated for the initial questionnaires and the replacement questionnaires, as well as combined. For each experimental case, a replacement questionnaire was sent if no response was received from the initial mailing by the predetermined cutoff date. Since no experimental stimulus was used for the replacement mailing, a difference in replacement questionnaire return rates presumably indicates a residual effect from the earlier deadline messages or the compressed mailing schedule.

2.4.2 Speed of Returns

Another evaluation measure was the timing of the mail returns. The compressed schedule treatments only altered the mailing date of the first three mailing materials and not the

² This unanticipated change, which involved sampling from each local census office’s housing units as they were added to the sample frame database, had only a minor impact on sample sizes in the end.

³ Coverage Followup is a census operation that obtains additional coverage information (e.g., residence data for cases indicating an undercount or overcount issue) by re-contacting census respondents via telephone.

replacement mailing. Thus, the analysis was limited to the initial questionnaires when calculating the speed of returns, which was examined in the form of cumulative percent of daily mail returns. Receiving mail returns more quickly can reduce cost because it reduces the number of households to which a replacement questionnaire would be sent. It also can reduce coverage errors since research shows higher coverage errors for late mail returns (Martin, 2007).

2.4.3 Item Nonresponse Rates

Item nonresponse rates for the initial questionnaire were examined for household-level and person-level items. The two household-level items were tenure and population count. The five person-level items were relationship, sex, age/date of birth, Hispanic origin, and race. Item nonresponse rates were computed at the item level for all occupied cases in the following manner:

$$\text{Item Nonresponse Rate} = \frac{\text{Number of "Missing" Responses}}{\text{Total Records}} * 100$$

“Missing” refers to responses that were not reported by the respondent. For person-level items, the item nonresponse rates were calculated only for Person 1 through 6 and restricted to data-defined persons⁴.

2.4.4 Public Reaction

We attempted to identify public reaction to the deadline messages by monitoring articles from the Census Bureau’s Public Information Office daily media clips. We investigated various sources of negative public feedback. This information is anecdotal and not generalizable; we did not have the resources to develop and implement a comprehensive, systematic approach to provide actual estimates of public reaction.

2.4.5 Within-Household Coverage

We compared within-household coverage measures in each of the panels, overall and by stratum. These include average household count before editing/imputation, average household count after editing/imputation, as well as the proportion of households sent to Coverage Followup by panel and source of coverage improvement. The 2006 Decennial Short Form experiment, mentioned earlier, found evidence of within-household coverage improvement in the presence of a deadline combined with a compressed schedule.

2.5 Variance Estimation

Due to the stratification in the sampling design, standard errors should typically be lower than those produced from a simple random sample. However, the homogeneity of results within a household for person-level statistics typically increases the standard errors since the majority of person information within a household is typically provided by one respondent. To account for these factors, we used a stratified jackknife replication procedure. Due to software and processing limitations, we used a random groups method to create the replicates. The random groups method involved sorting housing units in the order they were selected and reassigning them to 250 different groups, or replicates. This was more efficient than creating one replicate for each housing unit (i.e., primary selection unit), which would have resulted in tens of thousands of replicates.

⁴ A person is considered data-defined, or valid, if they have at least two of the person-level data items filled. The person-level data items include name, relationship, sex, age/date of birth, Hispanic origin, and race (Alberti, 2008).

To help ensure the validity of statistical inference when making multiple panel comparisons, we used a multiple comparison procedure. The family or group of comparisons must exhibit a stronger level of evidence against the null hypothesis in order for an individual comparison to be deemed “significant,” which compensates for the number of comparisons being made.

The multiple comparison procedure is intended to control for statistically significant differences between panels by reducing the probability of a Type I error or “false positive” (i.e., the null hypothesis is incorrectly rejected when it is true). The Dunnett’s procedure was used for the bulk of this analysis since all panels were compared to the Control panel⁵. We used the multiple comparison procedures to control to an alpha error rate of 0.10 per family of comparisons.

3. Limitations

The following limitations should be taken into account when interpreting the results from the experiment:

- Media and advertising play an important role in the public's willingness to participate in a census. When the media referred to the 2010 Census, a deadline was sometimes reported even though no explicit deadline was given by the Census Bureau to households outside of the deadline messaging experiment panels. Some news reports used the word “deadline” while others used “due date” or other variations (Stokes, 2010). The date was also not reported consistently. We cannot accurately measure whether the impact on respondents' census participation, specifically due to media reports of a due date, was uniformly distributed across the population or whether it differentially affected specific population groups. However, the 2010 Census Deadline Messaging and Compressed Mailing Schedule experiment's sample design included control and treatment groups that cut across population groups. Thus, we are able to measure significant changes in response rates due to the deadline message treatments compared to the control group, even in the presence of variations in the due date within the advertisement campaign, media reports, and mailing materials.
- By requirement, the data capture contractor (Lockheed Martin) was given up to 48 hours to check in mail returns after receipt at the data capture center. This means there could be up to a two day lag in the check-in time from when forms were actually received. This may have slightly affected the comparability of the speed of returns analysis for the compressed mailing schedule panels versus the production mailing schedule panels.

4. Results

4.1 Universe

The universe for this experiment’s mail response analysis consists of housing units that were selected in sample and mailed back a questionnaire. The universe excludes housing units considered unmailable, as well as housing units that were flagged as having called Telephone Questionnaire Assistance (as the assistance provided by an agent could have

⁵ For specific supplemental analysis, the Dunn’s procedure was used since panels were compared to each other and the number of comparisons within a family was relatively small.

potentially compromised the experiment). For all other analyses, the universe consists of the occupied housing unit subset of the larger universe described above. Table 3 below shows the number of occupied housing units in the universe for mail return rate estimates, the item nonresponse estimates, and within-household coverage estimates.

Table 3. Number of Occupied Housing Units by Panel and Stratum

PANEL	Total	STRATUM		
		High Response	Medium Response	Low Response
1 Control	15,299	5,784	3,409	6,106
2 Mild DM	15,342	5,811	3,417	6,114
3 Progressive DM	15,353	5,812	3,390	6,151
4 NRFU DM	15,308	5,807	3,392	6,109
5 Cost Savings DM	15,296	5,796	3,397	6,103
6 CS	15,292	5,788	3,403	6,101
7 Mild DM + CS	15,291	5,823	3,399	6,069
8 Progressive DM + CS	15,294	5,769	3,407	6,118
9 NRFU DM + CS	15,218	5,785	3,378	6,055
10 Cost Savings DM + CS	15,347	5,801	3,412	6,134
Total	153,040	57,976	34,004	61,060

Source: CPEX Sample File

4.2 Mail Return Rates

Mail return rates were the primary analytical measure used to evaluate the success of the treatment panels. Return rates, which are one measure of census cooperation, indicate if respondents in one panel are more, or less, likely to respond than those in another panel.

Table 4 contains mail return rate estimates by panel for the initial and replacement mailings, as well as the combined results, at the national level.

Table 4. Mail Return Rates by Panel

Panel	Initial	Replacement	Overall
1 Control	71.4 (0.40)	6.8 (0.23)	78.2 (0.35)
2 Mild DM	73.0 (0.39)*	6.5 (0.24)	79.5 (0.34)*
3 Progressive DM	72.6 (0.40)	6.0 (0.20)*	78.7 (0.36)
4 NRFU DM	73.1 (0.37)*	6.4 (0.22)	79.4 (0.32)*
5 Cost Savings DM	72.5 (0.37)	7.0 (0.22)	79.5 (0.32)*
6 CS	71.5 (0.40)	7.1 (0.23)	78.6 (0.36)
7 Mild DM + CS	72.4 (0.38)	6.4 (0.21)	78.8 (0.36)
8 Progressive DM + CS	72.8 (0.38)*	6.4 (0.22)	79.2 (0.34)
9 NRFU DM + CS	72.7 (0.39)*	6.2 (0.22)	78.9 (0.35)
10 Cost Savings DM + CS	72.8 (0.40)*	6.3 (0.21)	79.2 (0.35)

Source: CPEX Sample and Response Files; Standard errors in parentheses.

*Denotes statistically significant difference between panel and Control, when controlling to an error rate of $\alpha=0.10$ per family of comparisons.

Compared to the Control panel, there were statistically significant higher overall national-level mail return rates for the Mild DM panel (1.3 percentage points), the NRFU DM panel (1.2 percentage points), and the Cost Savings DM panel (1.3 percentage points).

For the initial mailing, the Mild DM panel (1.6 percentage points) and the NRFU DM panel (1.6 percentage points) were significantly higher than the control.

The mail return rate for the Progressive DM panel at the replacement mailing is statistically significantly lower than the rate for the Control panel. Although the replacement questionnaires were the same for all panels, the lower replacement mailing return rate may have been a negative public reaction from the more urgent message on the reminder postcard, which was received a week before the replacement. This was the only reminder postcard, of the four deadline messaging treatments, that included the following sentence: “Your response is required by law.” We hoped that this would motivate respondents to comply with the census but, instead, it appears to have lowered mail return rates. Another possible explanation for the lower replacement return rate is that the reminder postcard (and other mailing pieces in this panel) used the term “deadline,” which is stronger than “mail by.” This wording on the reminder postcard may have caused some respondents to believe that it was too late to return the replacement questionnaire. We do not have definitive evidence that either explanation was the cause of the lower replacement mailing return rate, given that the difference was relatively small, the overall return rate was not different, and the replacement questionnaires were the same for all panels, but these are possible explanations. Note that the overall return rate for this panel was unaffected and the rate difference is less than a percentage point.

The CS panel was not significantly different from the Control panel for the initial mail returns, the replacement mail returns, or overall. Supplemental analysis revealed that the compressed schedule treatment in combination with the deadline messaging treatments did not have significantly different mail return rates when compared to the corresponding messaging treatments alone. As expected, the higher initial mail return rates for the Progressive DM + CS panel, the NRFU DM + CS panel, and the Cost Savings DM + CS panel were driven by the deadline messaging treatments.

The Control panel had the lowest initial and overall mail return rate of all panels (although the point estimates were not always significantly different). This is supported by cognitive pretesting results for the mailing materials. Cognitive testing results found that the control message, with the instruction to fill out the form “today,” had the least favorable reactions and was overwhelmingly the message to which respondents indicated they would be least likely to respond (Nichols, Jurgenson, & Norris, 2009).

Upon further analysis, we found that the higher return rate for the initial mailing of the Mild DM panel, compared to the Control panel, seems to be isolated to the Low Response Stratum. However, the higher return rate for the initial mailing of the NRFU DM panel, compared to the Control, is isolated in the High Response Stratum.

4.3 Speed of Returns

Speed of returns was calculated using cumulative percent of daily mail returns for initial questionnaires, for the Control and CS panels (see Figure 1 below). This analysis only examined initial questionnaires, since there were no deadline messages on the replacement mailing materials and the compressed mailing schedule altered only the mailing dates of the first three mailing materials (advance letter, initial questionnaire, and reminder postcard) and not the replacement questionnaire (see Table 2). The Control panel was mailed according to the production 2010 Census schedule in which the initial questionnaire mailing began on March 15 and the reminder postcard mailing began on

March 22. The CS panel delayed the first three mailings by seven days to allow for a tighter schedule centered closer to Census Day. Thus, for the CS panel, the initial questionnaire mailing began on March 22 and the reminder postcard mailing began on March 29. For both panels, the replacement questionnaire mailing began on April 15.

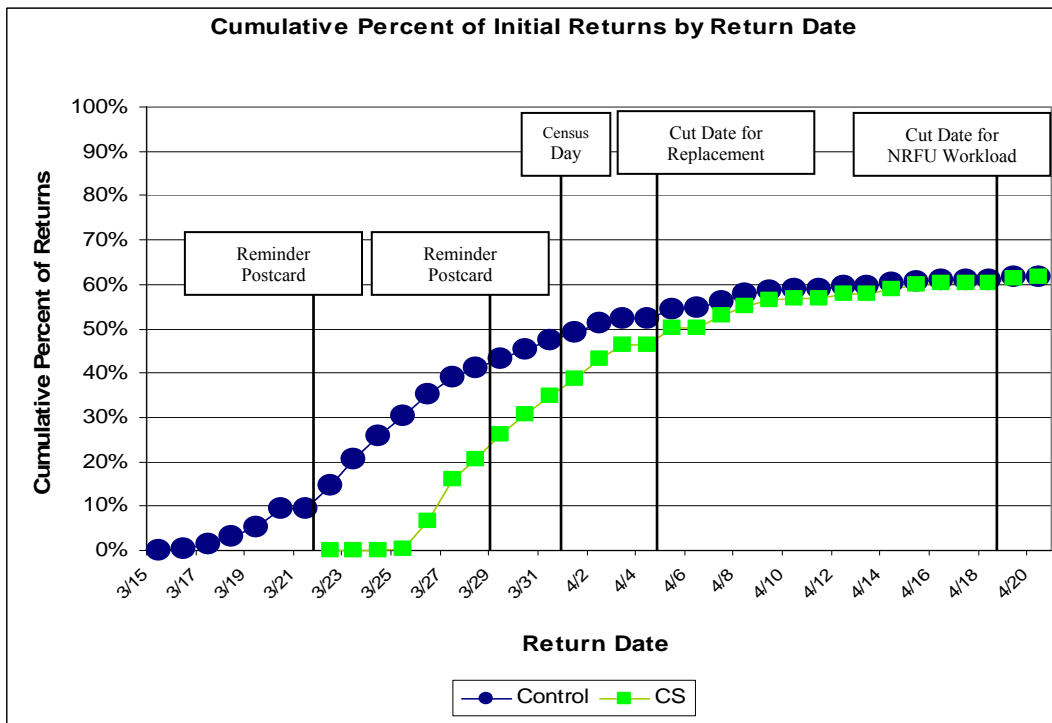


Figure 1. Speed of Returns for Initial Questionnaires in the Control and CS Panels

One impetus for examining a compressed schedule was the belief that compressed schedules might result in faster returns and thus reduce cost, since fewer replacement questionnaires would need to be sent. Figure 1 indicates that this is not the case. At the time of the reminder postcard, more returns have come in for the CS panel compared to the Control panel (26.1 percent and 14.7 percent, respectively) but the pattern changes by the time the replacement questionnaires are mailed. At the cut date for the replacement mailing (April 5th), the CS panel has fewer returns than the Control panel (50.2 percent and 54.5 percent, respectively). This is a difference of 4.3 percent, which would result in a large cost for using the compressed mailing schedule for a national mailout. By the cutoff date for determining the NRFU workload (April 19), the gap closes and the estimates are almost identical (61.5 percent for the CS panel and 61.6 percent for the Control panel).

The CS panel's slower speed of return was the opposite of its expected effect. The compressed schedule delayed the mailing so that the schedule would be tighter and centered closer to Census Day, which we hypothesized would speed the receipt of returns. However, it is possible that respondents held their forms until they felt it was close enough to Census Day to return them, since we asked for information as of April 1.

4.4 Item Nonresponse Rates

Item nonresponse rates were computed for the initial questionnaire, at the item level, for all occupied cases. There were two household-level items: tenure and population count.

Tenure determined if the housing unit was owned, rented, or occupied without payment while the population count item asked for a count of the number of people in the household. Results indicate that none of the item nonresponse rates was significantly different from the Control panel, for either item, overall or by stratum.

There were five person-level items for which item nonresponse rates were calculated. These items were relationship (to householder), sex, age/year of birth, Hispanic origin, and race. Results revealed that the item nonresponse rate for the race item in the NRFU DM panel was statistically significantly higher (0.9 percentage points) compared to the Control panel. Upon further analysis, we found that the higher item nonresponse rate for race for the initial mailing of the NRFU DM panel, compared to the Control panel, seems to be isolated to the Medium Response Stratum. We have no hypothesis-driven explanation for this result. The significant difference between Progressive DM and Control panels, for the relationship variable, is only marginally significant (0.2 percentage points). This estimate and standard error are the same as other panel estimates that were not found to be significant. Therefore, the statistically different results for relationship are not of practical significance.

A total form completeness analysis was also conducted by panel and stratum. No meaningful significant results were found.

4.5 Public Reaction

In an attempt to identify public reaction to the Deadline Messaging and Compressed Mailing Schedule Experiment, we monitored articles from the Public Information Office daily media clips. The purpose of this search was to identify any media activity regarding the experimental deadline message terminology. The media activity was searched from January 30 through April 5, 2010, which was the timeframe during which most activity related to this topic would have occurred. Overall, we did not find activity that was directly related to any of the experimental deadline messages.

To our knowledge, there were no discernible deadline messaging concerns exhibited in regards to the 2010 Census via print media. Audio public reaction via media is more difficult to monitor. However, as far as we know, there were no significant statements voiced over the air related to deadline concerns.

4.6 Within-Household Coverage

One measure used to compare within-household coverage differences between panels was average household count. This was examined, by panel, before and after editing. The pre-edited data consist of the number of data-defined persons by panel. As mentioned previously, a person is considered data-defined, or valid, if they have at least two of the person-level data items (i.e., name, relationship, sex, age/date of birth, Hispanic origin, or race) filled (Alberti, 2008). The post-edited data were obtained from the Census Edited File, which incorporated the results of various processing activities intended to improve quality and completeness, including imputation.

The pre-edited average household sizes for the panels ranged from 2.58 to 2.61. None of the treatment panels were significantly different from the Control panel in terms of average household size. A similar pattern was seen in the post-edited estimates; none of which were significantly different from the Control panel.

An additional within-household coverage measure was to examine panel differences in the percent of cases sent to Coverage Followup by source of coverage improvement (count discrepancy, undercount, large household, and overcount). This analysis yield very few differences that were found to be statistically significant, but not practically significant. In all cases, the estimate and standard error were the same as other panel estimates that were not found to be significant.

Given the lack of significant differences across panels for average household size and the lack of meaningful differences in cases sent to Coverage Followup, it appears that the presence of deadline messages and/or the compressed mailing schedule does not appear to affect within-household coverage.

5. Conclusions

Results showed that the overall national-level return rates for the Mild DM, NRFU DM, and Cost Savings DM panels were statistically significantly higher than that within the Control. The Mild DM and NRFU DM panels also saw significantly higher return rates at the initial mailing.

Upon further analysis, it appears that the higher return rates for the initial mailing of the Mild DM panel, compared to the Control panel, seem to be isolated to the Low Response Stratum. Conversely, the higher return rate for the initial mailing of the NRFU DM panel, compared to the Control, is isolated in the High Response Stratum.

The Progressive DM panel replacement mailing return rate was significantly lower compared to the Control panel, despite the fact that the replacement questionnaires were identical. It is possible that the Progressive DM panel reminder, which included the “your response is required by law” statement and the term “deadline,” lowered replacement mailing response rates. Instead of motivating respondents, the strong message might have agitated or confused respondents and thus reduced compliance. Another explanation is that the term “deadline” on the reminder postcard may have caused respondents to think it was too late to return the replacement questionnaire. Note that the overall return rate for this panel was unaffected and the rate difference was less than one percentage point.

The compressed schedule treatment in combination with the deadline messaging treatments did not have significantly different overall mail return rates when compared to the corresponding messaging treatments alone. In addition, the compressed schedule treatment alone, compared to the Control, yielded response rates that were not significantly different.

The speed of returns analysis showed that the Compressed Schedule panel had more returns, compared to the Control panel, at the time of the reminder postcard. However, at the date that determined the replacement mailing workload, the Control panel had more returns. At the date that determines the nonresponse followup workload, the two panels have an almost identical number of returns. The Compressed Schedule panel’s slower return speed, at the time of the replacement mailing, was the opposite of its expected effect. Although, it is reasonable to assume that forms completed closer to Census Day reflect a more accurate household composition, this is not measurable given the design of this experiment.

There were no significant differences between the Control panel and any of the experimental panels for household-level item nonresponse rates. In general, person-level item nonresponse rates were not significantly different compared to the Control, although the NRFU DM panel had statistically significantly higher item nonresponse for the race item and the Progressive DM panel had statistically significantly higher item nonresponse for relationship. However, the magnitude of the difference in the relationship item nonresponse rate was not of practical significance and we have no hypothesis-driven explanation for the increased item nonresponse for race in the NRFU DM panel.

An examination of Public Information Office daily media clips produced no discernable deadline message concerns in the 2010 print media.

There were a few statistically significant differences in the percent of cases sent to Coverage Followup across panels. However, there were no significant differences across panels for pre-edit or post-edit average household size. Thus, the presence of deadline messages and/or the compressed mailing schedule does not appear to affect within-household coverage.

Results from this experiment are useful in steering the 2020 Census research. More research needs to be conducted on targeting various contact strategies and deadline messages to specific portions of the population, but it is evident that deadline messages can improve response without negatively impacting data quality. Based on stratum results, a message that tells respondents how to avoid a personal NRFU visit could more effectively promote compliance for areas with high response. Likewise, the addition of a deadline alone (Mild DM) may work best for areas with traditionally low response. This research needs to be integrated into other data collection modes, such as Internet. Currently, discussions focusing on this topic are being conducted for the 2020 Census Testing Cycle. There are plans to conduct a contact strategies test in the early portion of the decade that involves mail and Internet response modes, so results of this experiment will directly feed into those plans for 2020 Census testing cycle.

6. References

- Alberti, N. (2008), "Specifications for the 2010 Census Data Capture Audit and Resolution," DSSD 2010 Decennial Census Memorandum Series #C-01, U.S. Census Bureau, December, 2008.
- Bentley, M. (2009). "Sample Specifications for the 2010 Census Program for Evaluations and Experiments," DSSD 2010 Decennial Census Memorandum Series, #G-05, February 24, 2009.
- Bouffard, J. A., S. E. Brady, & C. N. Stapleton, (2004). "2003 National Census Test: Contact Strategy Analysis," U.S. Census Bureau, January 20.
- Compton, E. (2009). "CPEX - Final Sample Sizes." E-mail to CPEX staff. 10 Oct. 2009.
- Fox, R. J., M. R. Crask, & J. Kim. (1988). "Mail Survey Response Rate: A Meta-Analysis of Selected Techniques for Inducing Response," *Public Opinion Quarterly*, Vol. 52, No. 4, pp 467-491.

Henley, J. R. (1976). "Response Rate to Mail Questionnaires with a Return Deadline," *Public Opinion Quarterly*, Vol. 40, No. 3, pp 374-375.

Kostanich, M., & K. Linse. (2009). "Identification of the 2008 Coverage Followup Eligible Universe and Selection", DSSD 2008 Census Dress Rehearsal Memorandum Series #G-05, January 9, 2009.

Martin, E. (2007). "Final Report of an Experiment: Effects of a Revised Instruction, Deadline, and Final Question Series in the Decennial Mail Short Form," Research Report Series Survey Methodology, #2007-25, U.S. Census Bureau.

Martin, E. (2009). "Can a Deadline and Compressed Mailing Schedule Improve Mail Response in the Decennial Census?" *Public Opinion Quarterly*, Vol. 73, No. 2, pp 361-367.

Nichols, E., N. Jurgenson, & D. Norris. (2009). "Report on Cognitive Pretesting of the 2010 Census Program for Evaluations and Experiments Panels Mailing Package: Deadline Messages," Statistical Research Division Study Series, Survey Methodology #2009-14, U.S. Census Bureau.

Stokes, S. (2010). "Deadline Messaging PIO Results," unpublished internal U.S. Census Bureau memorandum.

Zajac, K., & E. Letourneau. (2008). "Specification to Identify Replacement Mailing Housing Units in the 2010 Census," DSSD 2010 Decennial Memorandum Series, #G-04-R1, U.S. Census Bureau.

Appendix

Deadline messages on advance letter

Control: When you receive your form, please fill it out and mail it in promptly.

All Experimental Panels: When you receive your form, please fill it out and mail it in by April 5.

Deadline messages on outgoing envelope for initial questionnaire

Control: Nothing underneath “YOUR RESPONSE IS REQUIRED BY LAW”

Mild, NRFU, & Cost Savings: “Mail by April 5” in box underneath “YOUR RESPONSE IS REQUIRED BY LAW”

Progressive: Deadline is April 5” in box underneath “YOUR RESPONSE IS REQUIRED BY LAW”

Deadline messages on cover letter for initial questionnaire

Control: Please complete and mail back the enclosed census form today.

Mild: Please complete and mail back the enclosed census form by April 5.

Progressive: The deadline to complete and mail back the enclosed census form is April 5.

NRFU: Please complete and mail your census form by April 5 so that you can avoid a personal visit from an interviewer.

Cost Savings: Please complete and mail your census form by April 5. Mailing your census form on time saves money that would otherwise be used to follow up with you.

Deadline messages on reminder postcard

Control: If you have not responded, please provide your information as soon as possible.

Mild: If you have not responded, please provide your information by April 5.

Progressive: If you have not responded, the deadline to provide your information is April 5. Your response is required by law.

NRFU: If you have not responded, please provide your information by April 5 so that you can avoid a personal visit from an interviewer.

Cost Savings: If you have not responded, please provide your information by April 5. Mailing your census form on time saves money that would otherwise be used to follow up with you.