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Experimentation,
and Evaluation Program

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Analysis of the Social Security Number Notification Component of the Social Security Number, Privacy Attitudes, and Notification Experiment

FINAL REPORT

This research paper reports the results of research and analysis undertaken by the U.S. Census Bureau. It is part of a broad program, the Census 2000 Testing, Experimentation, and Evaluation (TXE) Program, designed to assess Census 2000 and to inform 2010 Census planning. Findings from the Census 2000 TXE Program reports are integrated into topic reports that provide context and background for broader interpretation of results.

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EXECUTIVE SUMMARY

The possibility of using administrative records from other federal government agencies to supplement census data has been investigated for some time at the Census Bureau. The use of administrative records could potentially increase completeness of measurement by reducing respondent burden with shorter questionnaires and improve data quality by eliminating memory/respondent errors. To realize maximum benefits, Social Security Numbers for each individual are needed to link responses to administrative data. The purpose of this analysis is to assess the effects of Social Security Number requests and different notifications of administrative record use on census response behavior, specifically form return and form completeness.

In addition to the Social Security Number requests for Person 1 and all household members, two notifications are tested. General notification of administrative record use informs the household that census data may be linked to data from other federal government agencies, while specific notification goes further to name the agencies from which data may be sought for linking.

This study is designed to determine if Social Security Number requests and administrative record use notification affect census response, form completeness among forms returned, and response to the Social Security Number item. Moreover, if such an effect exists, this study investigates whether the effect differs depending on the subpopulation to which the treatments are administered.

Historically, experimental analyses conducted by the Census Bureau and their contractors have involved a series of pairwise comparisons to measure statistical differences in response rates among the experimental treatments. The experimental design used in SPAN called for a different and more sensitive method. Throughout this report, logistic regression analysis is used to determine the effect of each treatment (SSN request, notification of administrative record use) on response.

Looking at the effect of the Social Security Number request, the results indicate that:

- The presence of a Social Security Number request for one or all household members results in a small, yet significant, decrease in mail response to Census 2000. Logistic regression results suggest that the Social Security Number request for all household members would decrease response by 2.1 percent in high census coverage areas and 2.7 percent in low census coverage areas compared to no request.

- The slight decrease in response due to the Social Security Number request is not statistically different between low coverage areas (expected to contain a high proportion of the Black and Hispanic populations and renters) and high coverage areas.

- The decline in response due to the Social Security Number request is modest considering past qualitative research assessing the extent to which people opposed this request

(Singer et al (1992); Aguirre International (1995), Singer (forthcoming)). However, the decline is comparable to the 3.4 percent drop in response due to the Social Security Number request cited in the 1994 Simplified Questionnaire Test (Dillman *et. al.*(1994)).

- Households receiving the Social Security Number requests have higher rates of incomplete form return compared to other households.

The findings from the analysis of notification of administrative record use on response and form completeness suggest that:

- Including general notification of administrative record use in the cover letter with the census form causes a small, but significant, decrease in response, while the inclusion of specific notification does not.

- When administered simultaneously, the combination of the Social Security Number request and specific notification of administrative record use decreases response (70 percent) compared to the condition where specific notification is the only treatment (73.5 percent).

- Interestingly, item nonresponse to the Person 1 Social Security Number (15.5 percent for Person 1 only, 15.8 percent for all household request) is significantly higher when no notification is included in the cover letter compared to the case when specific (11.5 percent) or general (12.6 percent) notification is present.

Based on these findings the following recommendations are made:

- If Social Security Numbers are requested in future censuses, the Census Bureau should be prepared for a decrease in mail response.

- The decline in mail response due to the Social Security Number request could be greater than these results convey if expanding the request to the entire nation fuels a public debate over privacy concerns.

- If more complete data on Social Security Numbers are desired above higher mail response, notification (general or specific) of administrative record use should be included in the cover letter with the census form.

1. BACKGROUND

The Census Bureau undertakes a program of experimentation during decennial censuses to measure the effectiveness of new techniques, methodologies, and technologies in the special environment that a decennial census generates, such as mass temporary hiring, promotion and outreach in coordination with local governments, the national paid advertising campaign, and the nationwide distribution of Census 2000 public use forms. Results from experiments form recommendations for subsequent testing and ultimately help design the next decennial census (Neugebauer, 1999).

Decennial censuses beginning in 2010 may rely on expanded use of administrative records information obtained from other Federal agencies. Because the use of administrative records has wide implications on decennial methodology, it is important to collect behavior and attitudinal data on several topics. They include how the public responds to requests for Social Security numbers (SSNs) on census questionnaires, how the public responds to differently worded notifications about the Census Bureau's use of administrative records, and the public's attitudes on privacy and confidentiality issues pertaining to the use of administrative records in a decennial census (Neugebauer, 1999).

The SPAN experiment consists of three major components to achieve the research objectives. The first component uses a list-assisted random digit dial (RDD) telephone survey to collect data on the public's privacy concerns; it is referred to as the Study of Privacy Attitudes in 2000 (SPA2000). The second analytical component involves the validation of SSNs collected from four experimental panels that request it. This evaluation examines what percentage of SSNs obtained in the experiment are valid by panel. The third component analyzes the effects of different notifications, two strategies for obtaining SSN information, and notification combined with the SSN request on response behavior and is called the SSN-Notification component (Neugebauer, 1999). This report contains a full analysis of the third component.

Specific research objectives of the SPA2000 component of SPAN include determining the public's opinion of the Federal government and the Census Bureau in general, of expanding uses of administrative records, and of the Census Bureau's possible interest in collecting SSNs in the future. SPA2000 is conducted at two different times; once before the paid advertising and promotion program and the enumerator recruiting program began, and once immediately after Census Day (Neugebauer, 1999). Comparing results between these two time periods indicates whether the "census environment" has an effect on the public's privacy attitudes. Each measurement group comprises a national RDD sample of 2,000 households. The pre-measurement survey occurred from July 14, 1999 to October 17, 1999. Data collection for the post-measurement survey began on or about April 8, 2000 and concluded around July 12, 2000. Note that SPA2000 results are provided as a separate section of the full report.

The SSN validation component will address the following questions: Are reported SSNs accurate? What are the characteristics of households that provide and do not provide the SSN? What is the effect of the short form general notification on SSN reporting? What is the effect of

the short form specific notification on SSN reporting? The final report involves the validation of SSNs collected from the four panels that request it. This evaluation examines what percentage of SSNs obtained in the experiment are valid by panel. In addition to counts of verified SSNs, the validation process also provides counts of the number of impossible SSNs--SSNs not found on the SSA's NumIDent File--and the number of partially matched, for example, cases that matched Name only, Name and Date of Birth, or Name and Sex. Exact matches obviously translate to validation of the SSN, where as the partial or equivocated matches are referred to as indirect validation (Neugebauer, 1999). Note that the SSN validation results are provided in a separate section of the full report.

The goal of the SSN-notification component, and hence this paper, is to assess the effects of different notifications and requests for SSN information on overall response to Census 2000 and data quality as suggested by form completeness. To date, no empirical research has measured the effects of a SSN request or public notification of administrative record use on mail response or form completeness in a decennial census environment, although research has been conducted during mid-cycle tests. The SSN-notification component is a panel experiment designed to compare mail response and form completeness rates among various panels with the aforementioned treatments.

1.1 Past Research

Past studies in the privacy and confidentiality realm show that people who are most concerned with privacy participate less in surveys and censuses than those who are not concerned (Kulka, Holt, Carter, and Dowd, 1991; Singer, Mathiowetz, and Couper, 1993; Gates and Bolton, 1998). To study this phenomenon, qualitative and quantitative analyses have been conducted to assess public opinion and response behavior to SSN requests on census forms. While the qualitative research such as the 1992 focus groups indicated extreme negative reaction to a SSN request, a mailout/mailback test (the 1992 Simplified Questionnaire Test (SQT)) indicated a smaller-than-anticipated actual decrease (-3.4 percent) in mail response rates (Dillman *et al*(1994); Singer *et al* (1992); Aguirre International (1995)). Note that this decrease occurred in conjunction with a shorter, respondent-friendly questionnaire, a prenotice letter, a reminder post card, and a replacement questionnaire. Also, among respondents listed on the SSN census form, just over 1 in 10 failed to provide a SSN (Bates, 1992). These findings were unexpected and seemingly contradicted the anticipated extent to which respondents would resist providing an identifier with data linking implications.

For further investigation, a question asking respondents' willingness to provide their SSNs on census forms was included in a series of surveys aimed at measuring privacy attitudes of U.S. residents over time. Singer (forthcoming) reports that the percentage of respondents willing to provide their SSN on a census form declined from 68% in 1996 to 55% in 1999 and 56% in 2000. The drop in willingness was significant between 1996 and 1999, but there was no further significant change between 1999 and 2000.

Past research on notification of administrative record use is qualitative in nature and therefore

does not indicate the effect of notification on census response. Past findings reveal that focus group participants are generally unsure about what effect notification will have on census response. Some believe that notification of administrative record use will have no effect on response, while others believe that notification will decrease response. With regard to the type of notification, focus groups administrators note that many of the participants did not understand the task of rating which notification was most persuasive in increasing participation, and instead rated the notification specimens by which use of records they felt was most justifiable (Aguirre International, 1995).

1.2 Hypotheses

Given the past research, several *a priori* hypotheses were developed prior to the data analysis. For the treatments for which past research is limited, hypotheses were developed based on expectations from privacy research.

1. With regard to the SSN request, it is hypothesized that mail response rates will drop when a SSN request is present, with a larger observable effect in areas of typically low census coverage, where response is already low, compared to high coverage areas.

2. Furthermore, it is anticipated that the request for SSN will increase the amount of incomplete forms returned compared to no SSN request.

There is little guidance from past research driving the hypotheses about the effect of notification on response.

1. In the absence of past quantitative studies, we suspect that notification of administrative record use will cause significant drops in mail response and increases in the amount of incomplete forms returned, with specific notification (including agency names) having a stronger effect than general notification.

2. Moreover, it is expected that requesting SSN in addition to providing either type of notification will decrease response compared to providing notification alone.

3. With respect to item nonresponse, we suspect that the SSN item for Person 1 will be missing at a higher rate when general or specific notification is included with the SSN request.

4. Lastly, we believe that notification of administrative record use will increase the amount of incomplete forms returned in a more pronounced way when coupled with the long form compared to the short form, due to privacy issues raised publicly regarding long form questions during Census 2000.

The SSN-notification component provides a better understanding of the potential ramifications of requesting SSN on behavior regarding questionnaire return, especially in a decennial census environment.

2. METHODOLOGY

2.1 Panel Design

The experimental treatments are implemented within ten panels in this experiment. Households selected for this experiment were randomly assigned to each panel. The panels divide into seven short and three long form panels. General descriptions of the panels are listed below:

- Two short form and two long form panels have differently worded notifications on administrative record use in the cover letter accompanying the form.
- Two short form panels have forms modified with a SSN request either for all household members or for only the person completing the form (i.e., "Person One"). Notification, beyond the statement informing respondents that providing SSN is voluntary, is not a part of these panels.
- Two short form panels combine the notification aspect and SSN request for all household members.
- There are two control panels, one short form and one long form.

More specifically:

Short Form Panels	**Long Form Panels**
CONTROL FORM (SFC)	CONTROL FORM (LFC)
(1) All SSN Request	(7) Specific Notification
(2) One (Person 1) SSN Request	(8) General Notification
(3) All SSN Request, General Notification	
(4) All SSN Request, Specific Notification	
(5) General Notification	
(6) Specific Notification	

Each panel receives the full complement of census mailout materials in the same sequence and timing as the official Census 2000 schedule. Experimental letters and forms *are* the official census forms received by the sampled households (see Appendix A for details).

There are two notifications, referred to as "general" and "specific." The notification is written in the letters accompanying the questionnaires and describes how and why the Census Bureau may use administrative records data from other Federal agencies. The general notification mentions the Census Bureau's possible use of statistical data from other Federal agencies, while the specific notification goes further to name the Federal agencies. The general notification is:

> To improve the quality of census statistics, the Census Bureau sometimes uses records from other government agencies. Using other agencies' records helps make the census more complete. By making

> better use of government records that already exist, the Census Bureau may be able to ask you fewer questions in the census.

The specific notification wording is:

> To improve the quality of census statistics, the Census Bureau sometimes uses records from other government agencies, such as the Social Security Administration, the Internal Revenue Service, or agencies providing public housing assistance. Using other agencies' records helps make the census more complete. By making better use of government records that already exist, the Census Bureau may be able to ask you fewer questions in the census.

Because providing the SSN is voluntary, the cover letter for the short form panels with the SSN request contains an additional statement:

> To improve the quality of census statistics, the Census Bureau sometimes uses records from other government agencies. For that purpose, we are asking for your social security number; however, providing your social security number is voluntary.

Note that the cover letter for short form panels with the SSN request and standard notification, which is used in the control panels, is similar to the official Census 2000 materials, but contains the additional statement.

2.2 Sample Design

The sample was selected on September 9, 1999 from the July 1999 version of the Decennial Master Address File (DMAF) mailout/mailback universe of 92,575,792 addresses, which excludes samples for the Accuracy and Coverage Evaluation (A.C.E.) listing, the contamination evaluation, as well as congressional addresses. Because the sampling universe comprises only mailout/mailback areas, list/enumerate and update/leave areas are excluded from the SPAN. Table 1 below contains the universe size at the point that this sample was selected.

The sample is equally allocated to two strata that reflect anticipated differences in the race and tenure composition of the population and, based on previous census experience, differences in the Census 2000 mail return rates. In general, census questionnaire design research projects prior to 1993 denoted these strata as "low response" (LRA) and "high response" (HRA) areas based on stratification at the 1990 district office level. For Census 2000, strata are based on 1990 census tract level race and tenure data and are denoted as low and high coverage areas (LCA and HCA respectively). The LCA stratum is expected to contain a very high proportion of the Black and Hispanic populations and renter occupied housing units. The HCA stratum contains the remaining addresses. The HCA stratum comprises approximately 81% of the total DMAF universe as of September 9, 1999.

Table 1. Universe Size: Mailout/Mailback Areas*

Form Type	HCA	LCA	Total
Short	63,378,681(68.5%)	15,184,672(16.4%)	78,563,353(84.9%)

Long	11,336,039(12.2%)	2,676,400(2.9%)	14,012,439(15.1%)
Total	74,714,720(80.7%)	17,861,072(19.3%)	92,575,792

*Excludes samples selected for A.C.E.listing sample, A.C.E. contamination evaluation, and congressional addresses.

All figures in this report are weighted to account for oversampling of the LCA stratum. The inverse of the sampling interval for each stratum within a panel is the weight for each case contained in that panel and stratum.

2.3 Issues with the SPAN Short Form Control (SFC) Panel

As part of Census 2000 data collection, the data processing team compiled check-in rates showing the number of forms returned on a daily basis for all experimental panels. From the very first days of processing, the SPAN SFC panel was seriously lagging behind all other experimental panels and Census 2000 in terms of the number of forms returned. Additionally, preliminary mail response rates, computed with the inclusion of UAAs, revealed that the SPAN SFC response rate was about 10% lower than other panels. Further investigation revealed that the UAA rate for the SPAN SFC was around 19% while it was 8 to 12% for other panels (see Table 1). Investigation into these issues revealed that the mailing of this particular panel was potentially problematic. Therefore, an alternate comparison groups was sought for this experiment.

Other experiments such as the Alternative Questionnaire Experiment 2000 (AQE2000) and the Response Mode and Incentives Experiment (RMIE) are imbedded in Census 2000 in addition to SPAN. Each experiment contains its own control panel in which households receive the non-experimental standard Census 2000 forms through mailout. Due to inherent problems with the SPAN short form control panel, the short form control group for the AQE2000 has been substituted for the SPAN short form control panel in this analysis. The AQE2000 short form control panel has the same sample size and allocation to strata as the SPAN control panel.

2.4 Effective Sample Size

The mailout sample size for each panel was a little over 5,200 addresses, totaling about 52,000 households in the United States selected for the SSN-notification component of this experiment (See Table 2 for more detail). The sample was randomly assigned to each experimental panel and is allocated equally to the HCA and LCA strata. This allocation is not necessarily optimum for estimating the overall response rates, but is desirable if reliable estimates of response rates are examined by stratum. The USPS returned about eight to ten percent of experimental forms (see Appendix C) that were mailed in each panel as undeliverable as addressed (UAA). These cases never had the opportunity to respond and are therefore excluded from the denominator of the response rates.

There were four cases across all SPAN panels (2 in the SPAN SFC, and 2 elsewhere) for which the household response was submitted via the Internet (See Table 2). Since response via the

Internet was not an experimental treatment, these households discovered the Census Internet site on their own. These cases are excluded from the analysis since the respondents had other motivations for responding aside from the SPAN experimental treatment.

Due to error in the UAA flag on the DMAF, fifteen respondent cases across all of the panels included in this experiment were mistakenly labeled UAAs (Note that the UAA rates in Appendix C do not include these cases). Further investigation of these cases revealed no systematic error in the assignment of the UAA flag, pointing to the conclusion that these cases were mistakenly marked UAAs during data capture operations. As suggested by the data processing team, it is possible that a case could be labeled UAA even though Census received a completed form if the questionnaire sorter in the data capture center was set incorrectly to UAA. This type of situation occurred in the 1998 Dress Rehearsal. These cases are included as respondents for this analysis and were not subtracted from the denominator in the response rate calculations as were the other UAAs.

Moreover, there were two cases across all of the SPAN panels for which there were duplicate records. This problem may be attributed to the fact that the questionnaires were mistakenly printed with a leading "1" in street address number. Census 2000 experimental questionnaires with a leading "1" were supposed to be destroyed and reprinted correctly. However, a report from a data administrator indicates that some erroneously addressed questionnaires may have been mailed to households, based on observations at the National Processing Center in Jeffersonville, Indiana. For the purposes of this analysis, any case with a duplicate record is excluded since it is not possible to determine which record contains the correct information.

Table 2. Mailout Sample Size, UAAs, Duplicates, and Electronic Responses by Panel

Panel	Initial Mailout Sample Size*		UAAs	Cases with duplicate records	Electronic Responses	Final Mailout Sample Size
	HCA	LCA				
Short Form:	18372	18369	3477	0	2	36741
SPAN Short Form Control (NOT USED)	2626	2622	970	11	2	5248
AQE Short Form Control (SFC)	2624	2625	498	0	0	5249
All SSN Request (Panel 1)	2624	2624	492	0	0	5248
One SSN Request (Panel 2)	2627	2620	458	0	0	5247
All SSN Request, General Notification (Panel 3)	2626	2629	518	0	0	5255
All SSN Request, Specific Notification (Panel 4)	2624	2624	497	0	1	5248
General Notification (Panel 5)	2624	2626	523	0	0	5250
Specific Notification (Panel 6)	2623	2621	491	0	1	5244
Long Form:	7867	7830	1675	2	0	15697
Long Form Control (LFC)	2624	2612	585	0	0	5236
Specific Notification (Panel 7)	2621	2608	522	1	0	5229
General Notification (Panel 8)	2620	2610	568	1	0	5230

* The sample sizes vary slightly from the original sample size listed in the Program Master Plan. After the plan was finalized, there were some GQ units discovered in the original sample that were removed prior to mailout.

2.5 Measurements

The mail response rate reported in this paper is similar to the official Census 2000 mail response rate in that it is a measure of respondent behavior with regard to the return of the experimental questionnaire. The mail response rate is defined as the number of non-blank questionnaires returned by mail for the treatment group (or panel) divided by the number of questionnaires mailed out less those returned by the USPS as UAA. Questionnaires returned as UAA are flagged by ID on the DMAF.

For Census 2000, blank forms are identified using a standard census algorithm (Memo from Hogan to Miskura and Longini). This algorithm treats questionnaires with less than 2 completed items among respondent-reported household count, tenure, and all 100% person items (race, Hispanic origin, gender, age, date of birth) as blanks. Due to intense labor involved in replicating the complete blank form edit procedures in the aforementioned memo as well as the fact that the procedure could not be completely replicated due to inherently complicated programming in the Optical Character Recognition (OCR) and Key From Image (KFI), a more simple technique is used which efficiently detects the majority (if not all) of the blank forms. In this modified technique, blank forms are defined as returned questionnaires where the number of completed items for the household, person 1 and person 2 is less than two. The first step in this algorithm involves identifying variables with missing data for all of the 100% items for persons 1 and 2 as well as respondent-reported population count and tenure (Note that respondent-reported household count is denoted as missing in this algorithm if it is zero). If the number of filled items from this list is less than 2, then these cases are marked as non-respondents since they are technically blank according to the blank forms algorithm. Manual checking of the SFC and panel 8 (SPAN LF with general notification) cases that are marked as blanks by this algorithm revealed that each marked case is truly blank according to the specifications in the #K-3 memo. Note that this algorithm varies slightly from the standard census procedures given in the referenced memorandum. The algorithm used here treats questionnaires with at least 2 items completed across persons 3 through 6 as blank if there is not one completed item for the household, person 1 or person 2; however, the likelihood of finding a questionnaire with this completion pattern is thought to be low. See Appendix B for a listing of the number of blank forms by panel.

Form completeness is measured in a few ways. Item nonresponse rates (See Appendix D) indicate the percent of data missing for a particular questionnaire item over all forms returned by responding households. For person-level characteristics, item nonresponse rates are calculated for person numbers less than or equal to the number of persons in the household as reported by the respondent.

In a second approach to measuring form completeness, the official Census 2000 Data Defined Person Algorithm creates a standard census measure indicating whether a household requires count discrepancy followup and/or whole person imputation to be considered complete due to missing items on at least one household member. A person record is data defined in Census 2000 if at least two of the 100% data items are completed (See Memo from Hogan to Longini

and Marx). For this analysis, the number of persons recorded by the respondent as living in the household is compared to the number of data defined individuals in that household to determine if the numbers match. If the number of data defined people is less than the respondent-reported household count, the form fails the count discrepancy coverage edit and requires followup/imputation in order to obtain complete data (See Memo from Hogan to Longini attention Stoudt). In addition to being a measure of data quality, this measure is directly related to increased costs associated with following up households that fail this specific coverage edit.

Lastly, a form completeness indicator is created to determine which households have at least some missing data on their census forms. Cases with at least some missing data are identified as those households with complete respondent reported household counts that are missing any of the following for the household or household members: household count, tenure, sex, date of birth/age, race, and ethnicity.

2.6 Analytic Procedures

The analysis of the experimental questionnaire data is conducted by measuring the pairwise differences in SSN item nonresponse rates among the panels and by modeling the response rates, form completeness rates, and count discrepancy follow-up rates using logistic regression models. The analysis is designed so that statements about the significance of treatment effects (i.e. differences in response rates) can be made about all tests simultaneously while maintaining a 90 percent confidence level (the Census Bureau Standard).

The pairwise comparisons component of this study provides estimates of the actual differences among panels with regard to the variables of interest. Using a multiple comparison procedure (MCP), the comparisons were carried out so that statements about the entire family of pairwise comparisons are made while maintaining the 90 percent simultaneous confidence level, where a family is defined as a collection of inferences for which it is meaningful to take into account some combined measure of errors. The use of a MCP is appropriate if, in order for a final decision to be correct, it is necessary that all inferences be simultaneously correct. Specifically, MCPs require that larger differences exist between individual treatments to be considered significant, when many treatments are being compared. The significance or alpha level for each response rate comparison within a family in this analysis is adjusted using the Bonferroni MCP where the formula for the confidence interval around the difference is

$$(\theta_i - \theta_j) \pm t_{(\alpha/2m)} \ (VAR(\theta_i - \theta_j))^{1/2}$$

where θ_i and θ_j are the treatment means, $t_{(\alpha/2m)}$ is the upper α point of the t distribution for m pairwise comparisons, and $Var(\theta_i - \theta_j)$ is the variance of the difference.

The logistic regression approach provides a quick and effective means for evaluating whether differences in response, form completeness and count discrepancy follow-up rates for each of the main experimental treatments are influenced by the presence of other treatments. Interpretation of the logistic regression results is based on parameter estimates and odds ratios of significant experimental treatment effects. These estimates assess the magnitude of the impact of the

treatment on a household's odds of mailing back the census questionnaire and having missing data on the returned form. In addition, they assess the Census' odds of having to followup/impute due to count discrepancies.

Parameter estimates, which are estimated coefficients for the predictor variables, are directly related to odds ratios. The parameter estimate for any variable is the natural logarithm of the odds ratio. Hence, exponentiating the parameter estimate yields the odds ratio for that variable. The odds ratio of a given experimental treatment describes the odds of having the dependent variable equal to one as compared to the baseline treatment. The following example demonstrates the utility of this relationship.

Consider a model with one independent variable, say an indicator of whether a household received an experimental form with the SSN request for all persons. The dependent variable in the model is response to the census. If the household mailed back their questionnaire, the response value is 1. If a household did not return their questionnaire, the response value is 0. Suppose 100 persons are cross-classified by the SSN request indicator variable and response to the census as follows (NOTE: data are fictional):

	Did not receive SSN request	Received SSN request	Total
Responded to the Census	21	22	43
Did not Respond to the Census	6	51	57
Total	27	73	100

A logistic regression model is fit to these data to predict the probability of responding to the census. The odds of responding to the census for a household that did not receive the SSN request is the ratio of the probability of the non-SSN request household responding (21/27) to the probability of this household not responding (6/27). The resulting odds for households not receiving the SSN request for all persons is 21/6. The odds of responding to the census for households receiving the SSN request for all persons are similarly calculated as (22/73)/(51/73) = 22/51.

The odds ratio for the SSN request indicator variable is defined as the ratio of the odds for households not receiving this experimental treatment to that for households receiving this treatment. In this example, the odds ratio is (21/6)*(22/51) = 8.11. This means that the odds of responding to the census are 8.11 times higher for households not receiving the SSN request than for households receiving this treatment. Note that the closer the odds are to 1, the less important the independent variable is in predicting response to the census. If the odds of the experimental indicator above were 1, then households not receiving the SSN request for all persons and households receiving this treatment would be equally likely to respond to the census.

2.7 Variance Estimation

In order to take into account the stratified sample design in the data analysis, WesVarPC Version 2.12 is used to compute standard errors for all estimates and models using a replication methodology. WesVarPC Version 2.12 requires a two Primary Sampling Unit (PSU) per stratum design in order to use a stratified jackknife variance estimation methodology. Since there is no clustering in our sample and only two strata to which the sample is allocated, a simple jackknife approach as suggested by Bob Fay, senior mathematical statistician at the U.S. Census Bureau, is substituted for the stratified jackknife when computing the response rates and item non-response rates. This methodology requires forming 256 replicates by numbering observations consecutively within strata. Note that replicate samples are combined across the two strata, which is generally avoided in analyses that involve stratified jackknife replication. The proposed design balances the replicates by selecting them from both strata.

Twenty replicates are used in computing the standard errors for analyses involving item nonresponse since the sample size is much smaller when only respondents are considered.

Quality assurance procedures were applied to the design, implementation, analysis, and preparation of this report. The procedures encompassed methodology, specification of project procedures and software, computer system design and review, development of clerical and computer procedures, and data analysis and report writing. A description of the procedures used is provided in the 'Census 2000 Evaluation Program Quality Assurance Process.'

3. LIMITATIONS

3.1 Population Coverage

There are certain limitations of this experiment which are inherent in the design. First, the sampling frame does not entirely represent the Census 2000 universe. Addresses selected for the Accuracy and Coverage Evaluation (A.C.E.) initial listing samples are excluded from the universe, as are addresses selected for A.C.E. contamination evaluation. Also excluded are those households not in the mailout/mailback universe, namely those in the list/enumerate and update/leave areas which tend to be more rural than addresses in the mailout/mailback universe. Since the goal of this experiment is to evaluate response behavior with regard to mail alternatives, our population of inference is by definition the mailout/mailback universe. However, addresses added through coverage improvement programs between the printing of address labels in September 1999 and the questionnaire mailout in early March 2000 are not included in the sampling frame which may result in a slight undercoverage of the target population. Also note that Coverage Edit FollowUp (CEFU) and large household follow-up were not performed for experimental cases.

Furthermore, non-English speaking households are excluded from this experiment since the SPAN questionnaires and forms have only been printed in English. This language restriction is in contrast to the rest of Census 2000, where respondents can request questionnaires in a variety

of languages. The cost associated with translating experimental forms is prohibitive, considering the small number of experimental households expected to benefit from the translation. Although this language restriction limits generalizability, no differential effects are expected across any of the panels due to the random assignment of households to the treatment groups in this experiment.

3.2 Undeliverable Forms

Some experimental questionnaire packages sent to those selected in the sample may be returned due to the fact that they are UAAs, which is considered by the USPS to be undeliverable as addressed (see section 2.3 for more detail). The sample selected in this experiment will likely have a higher UAA rate than Census 2000 since the sample is selected prior to final verification of addresses by the USPS. However, due to the random assignment of households to treatment groups, the assumption is made that there are no differential UAA rates across panels for this experiment. Census tests within the last decade which reported UAA statistics repeatedly found no evidence of differential panel UAA rates. Pairwise comparisons of weighted UAA rates among the short form and long form panels in this experiment indicate no significant differences, replicating results exhibited in pre-Census 2000 response rate tests. See Appendix C for statistical comparisons of UAA rates.

3.3 Causal Assumption about the Effect of the Treatment

In comparing panel response across experimental treatments, a critical causal assumption is made regarding respondent behavior. The assumption is that each respondent who provides data for a particular experimental treatment has been both exposed to the written notification and/or SSN request, and knowingly decides to engage in the behavior such as returning the form with full awareness of the experimental treatments embedded in the mailout package. Some respondents may not have read the questionnaire cover letter and therefore may not have noticed the notification of administrative record use. There is no way to ascertain a direct causal relationship between treatment and respondent behavior. However, due to the random assignment of sample cases to the experimental treatments, we assume that there are no differential confounding motivational effects across treatments.

4. RESULTS

4.1 Mail Response Rates[1]

As of April 18, 2000, the Census Bureau reports that 66.6% and 54.1% of short and long Census 2000 forms respectively were returned (See GAO report). Note that this figure is not directly comparable to the response rates in this experiment since UAAs are included in the denominator of this figure whereas they are excluded from the denominators of the figures below.

[1] Although UAAs are excluded from the denominators, the response rates are not return rates since the vacancy status of the units is unknown.

Additionally, this census figure includes the return of forms from cases outside of the mailout/mailback universe. Likewise, response files for the SPAN experiment were created on June 14, 2000 and thus include mail returns sent in beyond the April 18th cutoff.

Historically, experimental analyses conducted by the Census Bureau and their contractors have involved a series of pairwise comparisons to measure statistical differences in response rates across panels with various experimental treatments (See Treat (1996); Dillman, West and Clark (1994); Dillman, Clark and Treat (1994)). The experimental design used in SPAN called for a different and more sensitive method. Throughout this report, logistic regression analysis is used to determine the effect of each treatment (SSN request, notification of administrative record use) on response. The advantages of using this technique in the assessment of significant factors are many. First, the effect of the treatment on response can be determined in the presence of other treatments or control variables, adding credibility to the findings. Control variables used in unit or item nonresponse models include strata, length of the census form, and discrete or continuous measures of the demographics of Person 1 on the census form.

Secondly, logistic regression maximizes power in statistical tests since panels sharing a common treatment are all included in the assessment of that treatment's effect on response, holding any other experimental treatments in those panels constant. For instance, the treatment involving the SSN request for all household members is instituted in three separate panels (panels 1, 3 and 4) as shown in Table 2. Note that panels 3 and 4 contain notification treatments in addition to the SSN request. Whereas a pairwise comparison approach would assess the effect of the SSN request using only the comparison of panel 1 to the control panel, the logistic approach simultaneously controls the notification treatment in panels 3 and 4. In this way, panels 3 and 4 can be included in the assessment of the full treatment effect of the SSN request for all household members. Specifically, tests of panel 3 (all SSN request, general notification) versus panel 5 (general notification) will contribute to the study of the effect of the SSN request on response in a logistic regression model whereas it will not have any influence when using a simple pairwise comparison approach.

Finally, the logistic regression technique provides results that are more insightful with respect to designing experiments for 2010 planning. Logistic regression results provide overall treatment effects, giving experiment designers more information and flexibility when designing a follow-up experiment with the specific treatments. Pairwise comparison results alone are more difficult to use for designing subsequent experiments when experimental panels involve more than one treatments and less than the full set of treatment combinations are tested.

Mail response rates for the various panels in this experiment are included in Appendix E. Note that the results of simple pairwise comparisons of the response rates across panels may not fully agree with the results illustrated by the logistic model below due to the differences in the approaches as mentioned above. With regard to the response rates, it is interesting to note that response rates are consistently lower in the LCA than the HCA across all experimental panels in accordance with stratification expectations as shown in Tables E.1 and E.2 in the Appendix. Additionally, long form mail response rates are lower than short form rates throughout this

report, consistent with Census 2000.

4.1.1 What is the Effect of the SSN Request?

Based on past research findings, it has been suggested that the request for the SSN of Person 1 or all household members will decrease response, with a more pronounced effect in low census coverage areas compared to high coverage areas.

In order to assess the effect of the SSN request in the presence of other treatments, logistic regression analysis is used to model a household's odds of responding to the census. The Simple Model shown in Table 3 investigates the effect of the SSN request for one or all persons and notification on response, while controlling for strata and form length. This model assumes that the effect of a treatment on response is constant within the other experimental treatment. The purpose of the models with the interaction terms is to relax this assumption associated with the Simple Model. That is, the interaction terms help determine if a treatment effect differs among subpopulations and other treatments. The SSN-Strata Interaction Model determines whether the effect of the SSN request on response differs based on the subpopulation from which it is requested (i.e. HCA versus LCA). Lastly, the Treatment Interaction Model, which is discussed in the next section, tests whether notification of administrative record use decreases response in the presence of a SSN request compared to notification alone.

Table 3. Logistic Regression Coefficients Predicting the Log Odds of Responding to the Census

Variable	Simple Model[a]	SSN-Strata Interaction Model	Treatment Interaction Model
SSN Request:			
For Person 1 = 1	**-.099***		-.071
For Household = 1	**-.113***		-.053
For Person 1 or Household = 1		**-.105***	
Notification:			
General = 1	**-.090***	**-.094***	-.063
Specific = 1	-.037	-.041	.019
Form Type:			
Long Form = 1	**-.454***	**-.454***	**-.454***

Table 3. Logistic Regression Coefficients Predicting the Log Odds of Responding to the Census

Variable	Simple Model[a]	SSN-Strata Interaction Model	Treatment Interaction Model
Strata:			
High Coverage Areas = 1	**.757***	**.761***	**.757***
Interactions:			
SSN Request for either * Strata		-.006	
General Notification * SSN for Household			-.060
Specific Notification * SSN for Household			**-.120***
Intercept	.429	.430	.402

* Indicates statistical significance at $\alpha = .1$.

[a] A test of the combined effect of the SSN request for all household members and Person 1 reveals that any request for SSN decreases response. Therefore, the SSN-strata model combines these treatments.

The Simple Model logistic results in Table 3 suggest that the request for the SSN of Person 1 as well as the SSN request for all household members significantly decreases response to the census, while controlling for notification and type of area (odds of responding to the census decrease by 9.5% for the Person 1 SSN request, 11% for the SSN request for all households members[2]). While this decrease in response is significant, it is also fairly small. The drop in odds suggests about a 2.1% decrease response in high coverage areas and a 2.7% drop in low coverage areas when the SSN request for all household members is present. This drop in response supports our hypotheses formed in light of past privacy research. However, in contrast to our initial hypotheses, the SSN-Strata Interaction model reveals no differential effects of the SSN request on response (SSN*Strata = -.006) between areas which differ with regard to their demographics and propensity to respond to the census, while controlling for notification. Since SSN is a unique identifier in addition to an excellent tool for linking to administrative data, one would conjecture that the request for SSN would further dissuade those who tend to avoid the census from replying. However, the data do not support this hypothesis, suggesting that the slight drop in response due to the SSN request is the same in low and high coverage areas.

4.1.2 What is the effect of notification of administrative record use on response?

[2] Odds are calculated as the exponential of the coefficient in the model.

Recall that hypotheses regarding the effect of the notification of administrative record use on response are based on intuition, rather than on empirical data given the lack of past research in this area. In the absence of past data, it is suspected that notification of administrative record use will cause significant drops in mail response, with specific notification (including agency names) having a stronger effect than general notification. Moreover, based on past qualitative study, it is expected that adding either type of notification to the SSN request will decrease response compared to notification alone.

Logistic regression results given in Table 3 allow determination of the notification effects on response. Testing of the simultaneous significance of general and specific notification in the Simple Model reveals that, taken together, notification of administrative record use decreases mail response[3]. Looking at the effect of each notification type separately, the logistic results show that general notification causes a small, yet significant, decrease in response, while specific notification does not. Since this finding disagrees with our initial hypotheses, we further compared the parameters associated with general and specific notification. The magnitude of the parameters and therefore the effect on response between general and specific notification is not statistically different (H_0: $\beta_{specific} - \beta_{general} = 0$, p=.12).

With respect to the effect of notification on response in the presence of the SSN request, the Treatment Interaction Model in Table 3 suggests that specific notification has a more harmful effect on response when SSN is requested than the case where specific notification is the only experimental treatment. The combination of general notification and the SSN request does not cause further drops in response compared to general notification alone.

Since the hypothesis regarding the effect of notification in the presence of a SSN request did not distinguish between general and specific notification, another logistic model was run to assess the effects of either type of administrative record notification with the SSN request compared to notification alone (not shown). The SSN-notification interaction term is insignificant (p=.1056), indicating that in general, there is not sufficient evidence to conclude that notification of administrative record use further discourages response in the presence of a SSN request compared to notification alone. This finding contrasts the initial hypothesis of a more pronounced drop in response due to the pairing of notification with the SSN request.

4.2 Item Nonresponse Rates

To the extent that data for particular items are missing from the returned questionnaires, the amount of followup by census in order to resolve count discrepancies or measurement error could increase. In this section, we study the effects of the SPAN experimental treatments on data quality as measured by missing data.

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[3] The simultaneous significance of the general and specific notification was tested by summing the parameters and comparing the result to zero in a F-test (H_0: $\beta_{specific} + \beta_{general} = 0$). The results show that F=4.593 at p = .033.

4.2.1 What is the Effect of SSN request on Item Nonresponse?

Given the level of resistance shown in the past for SSN request, we hypothesize that the request for SSN will increase item missing data. Logistic regression models will be used to assess the validity of this hypothesis. Item nonresponse rates in Appendix D indicate the percent of data missing for a particular questionnaire item over all forms returned by responding households by experimental panel. For person-level characteristics, item nonresponse rates are calculated for person numbers less than or equal to the number of persons in the household as reported by the respondent. One striking feature of these data is the relatively low rates of missing data across all treatments.

The official census Data Defined Algorithm (discussed above in section 2.5) is used to create a dichotomous variable indicating whether a household requires followup based on a count discrepancy. Using this measure as the dependent variable, the odds of having to followup with a household due to a coverage failure are modeled using the experimental treatments and their interactions as predictor variables. Cases for which the respondent-reported household population count is missing or zero are excluded from these models since it is not possible to determine how many individuals are expected to have complete data. The dependent variable in the model is highly skewed in the sense that there are very few cases that require followup or imputation as determined by the Data Defined Person algorithm. More specifically, out of 28,525 households with completed respondent-reported household counts across all panels, only 216 require count discrepancy followup. This approach was replaced by an alternative measure of data quality.

As a proxy for data quality, the effect of the treatments on item nonresponse is assessed by looking at the effect of each treatment on the likelihood of a household having any missing data among 100% person items in addition to household tenure. Out of the 28,525 households with complete household counts, 3,385 out of 21,068 households responding to the short form had at least some missing data while 1,268 out of 7,457 households responding to the long form had at least some missing 100% items. The logistic results in Table 3 below are used to address the validity of item nonresponse-related hypotheses.

Table 4. Logistic Regression Coefficients Predicting the Log Odds of Returning an Incomplete Census Form

Variable	Simple Model	Notification-Form Length Interaction Model
SSN Request:		
For Person 1 = 1	.103	.107
For Household = 1	**.201***	**.201***
Notification:		

Table 4. Logistic Regression Coefficients Predicting the Log Odds of Returning an Incomplete Census Form

Variable	Simple Model	Notification-Form Length Interaction Model
General = 1	-.019	-.015
Specific = 1	.008	.015
Form Type:		
Long Form = 1	**.189***	**.243***
Strata:		
High Coverage Area = 1	**-.820***	**-.820***
Interactions:		
General Notification * Long Form		-.067
Specific Notification * Long Form		-.097
Intercept	-1.333	-1.337

* Indicates statistical significance at $\alpha = .1$.

In accordance with hypotheses, results from the Simple Model above reveal that the SSN request for all household members is associated with having missing data on the returned census form (odds of having missing data increase by a factor of 1.25). It is interesting to note that the request for the SSN of Person 1 is independently not associated with having missing data. However, collectively, any request for SSN seems to increase the odds of having at least some missing data on the form (H_0: $\beta_{\text{SSN for Person 1}} + \beta_{\text{SSN for household}} = 0$, p=.026).

Note that we attempted to model the proportion of missing data given these treatments using a linear regression approach. The dependent variable is highly skewed beyond the help of statistical transformations since there are many cases with no missing data. Therefore, the logistic results in Table 4 above must suffice for this analysis.

4.2.2 What is the Effect of Notification on Item Nonresponse?

We also suspect that notification of administrative record use will cause significant increases in item nonresponse, with specific notification (including agency names) having a stronger effect than general notification. Moreover, we believe that notification of administrative record use

will increase item nonresponse in a more pronounced way when coupled with the long form compared to the short form, due to privacy issues raised publicly regarding long form questions during Census 2000. Lastly, based on past qualitative research, we anticipate that the SSN item for Person 1 will be missing at a higher rate when any notification is included with the SSN request.

From the Simple Model in Table 4, it is clear that notification of administrative record use as a whole does not appear to adversely affect form completeness. Individually, neither type of notification has an effect, nor does one type have a stronger effect than the other. This finding contradicts prior hypotheses of a suspected correlation between notification and more item missing data.

The Notification-Form Length Model allows a test of the hypothesis that notification of administrative record use has a more harmful effect on form completeness on the long census form than the census short form. The interaction parameters in that model suggest that there are no differential effects of notification on form completeness between the long and short census forms, regardless of the type of notification.

In order to investigate the effect of notification on the completeness of the SSN item, item nonresponse rates for SSN are computed for the panels in which this information is requested. These figures were computed across all households for which the respondent-reported household count is greater than or equal to the person number.

Table 5. Item Nonresponse Rates (Standard Errors) for SSN

Panel	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
Panel 1 (all SSNs)	15.8% (.66)	21.6% (.92)	28.6% (1.21)	28.1% (1.63)	30.9% (4.21)	29.0% (5.00)
Panel 2 (One SSN)	15.5% (.77)	n/a	n/a	n/a	n/a	n/a
Panel 3 (all SSNs, general notification)	12.6% (.78)	17.3% (.87)	28.8% (1.55)	31.1% (1.84)	34.7% (4.28)	38.0% (8.09)
Panel 4 (all SSNs, specific notification)	11.5% (.67)	15.8% (.76)	22.9% (1.61)	24.5% (2.12)	30.6% (3.56)	47.3% (6.19)

In order to examine our success at obtaining SSN information[4] for Person 1, pairwise comparisons of Person 1 SSN item nonresponse rates are considered among the panels for which this information is requested (Panels 1 through 4). Each of these four panels received some degree of notification of the possibility of administrative record use due to the statement in the

[4] Cases with a SSN that is less than 9 digits or contains all nines or zeros are also treated as missing.

cover letter explaining the request for SSN.

Table 6. Multiple Comparisons of SSN Missing Rates for Person 1 by Panel

Pairwise Comparison	Difference
Panel 1 (all SSNs) - Panel 2 (one SSN)	.3% (1.22)
Panel 1 (all SSNs) - Panel 3 (all SSNs, general notification)	**3.2%*** (1.07)
Panel 1 (all SSNs) - Panel 4 (all SSNs, specific notification)	**4.3%*** (.86)
Panel 2 (one SSN) - Panel 3 (all SSNs, general notification)	**2.9%*** (1.17)
Panel 2 (one SSN) - Panel 4 (all SSNs, specific notification)	**4.0%*** (1.02)
Panel 3 (all SSNs, general notification) - Panel 4 (all SSNs, specific notification)	1.1% (.88)

* Statistically significant when familywise $\alpha = .1$.

The comparisons show that there is no difference in item nonresponse to Person 1 SSN when the panel requesting only one SSN is compared to the panel requesting all SSNs. From the perspective of Person 1, these forms do not differ in their request for SSN, and therefore no difference in response to this item is expected. Interestingly, the results above suggest that lower response to the Person 1 SSN item is obtained when the SSN for all household members or Person 1 is requested without specific or general notification of administrative record use. The distinction between general and specific notification has no measurable influence on response to the SSN item for Person 1.

To allow for comparisons of SSN item completion within demographic groups, logistic regression models were formed controlling for the demographics of Person 1 on the census form. Admittedly, past research indicates that Person 1 is not the respondent roughly 30% of the time (DeMaio and Bates,1990). However, no differential effects regarding this assumption are expected across treatment groups.

Table 7. Logistic Regression Coefficients Predicting the Log Odds of Person 1 SSN Missing by Experimental Treatments

Variables	Simple Model with Controls
SSN Request:	
For Household = 1	.009

Table 7. Logistic Regression Coefficients Predicting the Log Odds of Person 1 SSN Missing by Experimental Treatments

Variables	Simple Model with Controls
Notification:	
General = 1	**-.275***
Specific = 1	**-.357***
Strata:	
High Coverage Areas = 1	.061
Controls:	
Person 1 Black = 1	-.221
Person 1 Hispanic = 1	-.072
Age of Person 1	-.001
Number of Persons in Household	**.053***
Renter-occupied Household = 1	-.122
Intercept	-1.838

* Indicates statistical significance at $\alpha = .1$.

In agreement with the multiple comparison results, either type of notification of administrative record use yields higher completion for the Person 1 SSN item compared to no notification even when controlling for demographic factors. This finding agrees with the pairwise comparisons above, but contradicts our initial hypothesis. In retrospect, we believe that respondents may view this notification as justification for the SSN requests. Moreover, the statement about the potential for shorter future census forms due to the data linkage may be a persuasive factor in convincing respondents to provide this identifier.

5. RECOMMENDATIONS

In general, the effects of the treatments (i.e. notification, SSN request) on the response rates are not as substantial as originally anticipated. However, some effects are noticeable. For instance,

it is clear that requesting SSN, for all household members or Person 1, causes small, but significant, drops in response. Specifically, the odds of responding to the census decrease by about 9% when Person 1 SSN is requested and by approximately 11% when SSN is requested for all household members. Moreover, the request for SSN causes higher amounts of incomplete forms returned.

Notification of administrative data use is collectively associated with lower response as well, with general notification showing an individual effect when separated from specific notification. Once again, the drop is significant but slight. Specific notification has a more harmful effect on response when SSN is requested compared to the case when specific notification is the only treatment. General notification does not cause further drops in response when coupled with the SSN request compared to general notification alone.

Notification does not appear to have any negative effects on form completeness. In fact, notification of administrative record use actually increases response to the Person 1 SSN item compared to the case when no notification is given.

Given these findings, the Census Bureau should be aware that any request for SSN in future censuses may decrease mail returns. Yet, if better SSN data are desired above higher mail response, the results of this analysis suggest that notification should be included with the request.

Obviously, policy and privacy issues will be at the center of any debate over whether to include SSN requests on future census forms. Curiously, only 9 of the 210 calls made to Operator Assistance (OA) regarding the SPAN experiment included negative feedback concerning the use of SSN. However, the Census Bureau should be prepared for public airing of privacy concerns if SSN requests are extended to the entire nation. This finding suggests that focus groups should be convened to update findings from focus groups in the 1992 Simplified Questionnaire Test regarding reaction to the request for SSN.

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Table A.1. Panels of the SSN and Notification component, October 29, 1999.

Appendix A

Experimental PANELS	PLANNED MAIL OUT SAMPLE SIZE	COVER LETTER	OUTGOING ENVELOPE	QUESTIONNAIRE	RETURN ENVELOPE
SHORT FORM CONTROL	5,249	Official Census 2000: S-701A.1(L)	Official Census 2000: S-702A.1	Official Census 2000: S-700A.1	Colored: S-703A.1
ONE ALL SSNs	5,248	Statement that providing SSN is voluntary: S-701A.2(L)	Official Census 2000: S-702A.2	SSN request for all household members and unique OA and TDD numbers: S-700A.2	Colored: S-703A.2
TWO ONE SSN	5,248	Statement that providing SSN is voluntary: S-701A.3(L)	Official Census 2000: S-702A.3	SSN request for only one person in the household and unique OA and TDD numbers: S-700A.3	Colored: S-703A.3
THREE ALL SSNs with General Notification	5,255	Generally-worded notification language and statement that providing SSN is voluntary: S-701A.4(L)	Official Census 2000: S-702A.4	SSN request for all household members and unique OA and TDD numbers: S-700A.4	Colored: S-703A.4
FOUR ALL SSNs with Specific Notification	5,249	Specifically-worded notification language and statement that providing SSN is voluntary: S-701A.5(L)	Official Census 2000: S-702A.5	SSN request for all household members and unique OA and TDD numbers: S-700A.5	Colored: S-703A.5
FIVE General Notification	5,250	Generally-worded notification: S-701A.6(L)	Official Census 2000: S-702A.6	Official Census 2000 form with unique OA and TDD numbers: S-700A.6	Colored: S-703A.6
SIX Specific notification	5,245	Specifically-worded notification language: S-701A.7(L)	Official Census 2000: S-702A.7	Official Census 2000 form with unique OA and TDD numbers: S-700A.7	Colored: S-703A.7
LONG FORM CONTROL	5,236	Official Census 2000: S-701B.1(L)	Official Census 2000: S-702B.1	Official Census 2000: S-700B.1	Colored: S-703B.1
SEVEN Specific Notification	5,231	Specifically-worded notification language: S-701B.2(L)	Official Census 2000: S-702B.2	Official Census 2000 form with unique OA and TDD numbers: S-700B.2	Colored: S-703B.2
EIGHT General Notification	5,231	Generally-worded notification language: S-701B.3(L)	Official Census 2000: S-702B.3	Official Census 2000 form with unique OA and TDD numbers: S-700B.3	Colored: S-703B.3

Table B.1. Number of Blank Forms by Panel

Panel	Number of Blank Forms
Short Form Control (SFC)	14
All SSN Request (Panel 1)	16
One SSN Request (Panel 2)	21
All SSN Request, General Notification (Panel 3)	14
All SSN Request, Specific Notification (Panel 4)	25
General Notification (Panel 5)	26
Specific Notification (Panel 6)	16
Long Form Control (LFC)	30
Specific Notification (Panel 7)	28
General Notification (Panel 8)	23

Table C.1. Weighted UAA Rates by Panel

Panel	UAA rates Overall
AQE or Replacement Short Form Control (SFC)	8.6%
All SSN Request (Panel 1)	9.0%
One SSN Request (Panel 2)	8.0%
All SSN Request, General Notification (Panel 3)	9.4%
All SSN Request, Specific Notification (Panel 4)	8.5%
General Notification (Panel 5)	9.1%
Specific Notification (Panel 6)	8.3%
Long Form Control (LFC)	10.5%
Specific Notification (Panel 7)	9.2%
General Notification (Panel 8)	10.2%

Table C.2. Pairwise Comparisons of UAA rates (Short Form)

Pairwise Comparison	Overall Difference
SFC - Panel 1 (all SSNs)	-.4%
SFC - Panel 2(one SSN)	.6%
SFC - Panel 3 (all SSNs with general notification)	-.8%
SFC - Panel 4 (all SSNs with specific notification)	.1%
SFC - Panel 5 (general notification)	-.5%
SFC - Panel 6 (specific notification)	.3%
Panel 1 (all SSNs) - Panel 2 (one SSN)	1.0%
Panel 1 (all SSNs) - Panel 3 (all SSNs with general notification)	-.4%
Panel 1 (all SSNs) - Panel 4 (all SSNs with specific notification)	.5%
Panel 1 (all SSNs) - Panel 5 (general notification)	-.1%
Panel 1 (all SSNs) - Panel 6 (specific notification)	.7%

Panel 2 (one SSN) - Panel 3 (all SSNs with general notification)	-1.4%
Panel 2 (one SSN) - Panel 4 (all SSNs with specific notification)	-.5%
Panel 2 (one SSN) - Panel 5 (general notification)	-1.1%
Panel 2 (one SSN) - Panel 6 (specific notification)	-.4%
Panel 3 (all SSNs with general notification) - Panel 4 (all SSNs with specific notification)	.9%
Panel 3 (all SSNs with general notification) - Panel 5 (general notification)	.3%
Panel 3 (all SSNs with general notification) - Panel 6 (specific notification)	1.1%
Panel 4 (All SSNs with specific notification) - Panel 5 (general notification)	-.6%
Panel 4 (all SSNs with specific notification) - Panel 6 (specific notification)	.1%
Panel 5 (general notification) - Panel 6 (specific notification)	.7%

* significant when familywise α=.1.

Table C.2. Pairwise Comparisons of UAA Rates (Long Form)

Pairwise Comparison	**Overall Difference**
LFC - Panel 7 (specific notification)	1.3%
LFC - Panel 8 (general notification)	.3%
Panel 7 (specific notification) - Panel 8(general notification)	-1.0%

* significant when familywise α=.1.

Note that none of the UAA rates differ significantly as expected from past research results and this experimental design.

Table D.1 contains item nonresponse rates for short form questions on the experimental and control questionnaires. Person specific rates are computed for households for which the respondent-reported household count is greater than or equal to the person number. For example, nonresponse rates for the age of Person 4 are computed for households with 4 or more individuals as reported by the respondent.

Table D.1. Item Nonresponse Rates by Person Number and Panel for Short Form Panels.

Panel	Item	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
SFC (panel=0)	**Pop count**	1.82% (.19)					
	Age	1.03% (.19)	1.60% (.31)	2.38% (.45)	3.32% (.83)	4.52% (1.16)	3.00% (1.24)
	DOB	1.06% (.27)	1.96% (.33)	2.08% (.55)	2.98% (.90)	5.65% (1.73)	2.40% (1.18)
	Sex	0.33% (.12)	0.35% (.14)	0.96% (.33)	1.63% (.53)	3.74% (1.13)	8.60% (3.05)
	Race	1.50% (.19)	2.32% (.29)	3.41% (.47)	4.22% (.75)	5.99% (1.34)	3.60% (1.38)
	Hispanic Origin	3.23% (.36)	2.95% (.42)	4.78% (.64)	3.93% (.81)	5.60% (1.20)	6.10% (2.51)
	Reltnshp to P1		0.92% (.20)	0.87% (.24)	1.07% (.40)	2.40% (.93)	0.60% (.61)
Panel 1 (all SSNs)	**SSN**	15.78% (.66)	21.55% (.92)	28.57% (1.21)	28.13% (1.63)	30.93% (4.21)	29.03% (5.00)
	Pop count	2.79% (.36)					
	Age	1.56% (.25)	1.96% (.31)	2.14% (.46)	2.85% (.72)	5.45% (1.52)	1.76% (.77)
	DOB	1.75% (.23)	2.17% (.26)	2.43% (.39)	2.96% (.55)	3.92% (1.36)	1.32% (.73)
	Sex	1.18% (.17)	0.72% (.17)	1.31% (.32)	2.80% (.72)	2.70% (1.29)	2.20% (.96)

	Race	2.12% (.19)	3.33% (.31)	4.99% (.61)	5.65% (.99)	6.50% (2.65)	5.42% (2.43)
	Hispanic Origin	3.40% (.33)	3.90% (.42)	4.83% (.55)	5.54% (.93)	6.18% (2.25)	5.35% (2.10)
	Reltnshp to P1		0.67% (.19)	0.83% (.29)	0.92% (.38)	0.75% (.62)	1.76% (1.04)
Panel 2 (one SSN)	**SSN**	15.45% (.77)					
	Pop count	1.77% (.28)					
	Age	1.16% (.25)	1.70% (.36)	2.25% (.53)	1.93% (.54)	2.63% (1.03)	8.86% (4.06)
	DOB	1.51% (.29)	2.52% (.44)	3.00% (.59)	2.65% (.79)	1.58% (.84)	5.93% (2.85)
	Sex	0.65% (.21)	0.80% (.29)	1.28% (.36)	1.47% (.52)	1.97% (.91)	4.64% (2.42)
	Race	1.77% (.21)	2.80% (.28)	4.27% (.75)	5.09% (.73)	6.95% (1.32)	9.61% (3.63)
	Hispanic Origin	3.18% (.26)	2.67% (.42)	2.79% (.49)	2.38% (.72)	1.56% (.58)	2.93% (1.75)
	Reltnshp to P1		0.58% (.18)	0.77% (.37)	0.97% (.39)	0.26% (.18)	2.52% (1.76)
Panel 3 (all SSNs with general notification)	**SSN**	12.55% (.78)	17.31% (.87)	28.76% (1.55)	31.12% (1.84)	34.70% (4.28)	37.99% (8.09)
	Pop count	1.96% (.30)					
	Age	1.59% (.28)	2.50% (.53)	3.20% (.78)	5.79% (.84)	8.24% (2.67)	8.89% (4.87)
	DOB	1.65% (.29)	2.47% (.49)	3.57% (.82)	5.18% (1.07)	8.24% (2.35)	6.02% (4.11)
	Sex	0.79% (.19)	0.88% (.24)	1.35% (.40)	2.78% (.76)	3.69% (1.52)	3.01% (3.03)

	Race	1.78% (.23)	3.98% (.44)	6.05% (.75)	8.79% (1.18)	12.90% (2.60)	14.19% (5.19)
	Hispanic Origin	3.33% (.31)	3.97% (.37)	6.30% (.89)	5.61% (1.20)	7.34% (2.35)	8.17% (4.47)
	Reltnshp to P1		0.93% (.22)	1.39% (.37)	2.68% (.79)	2.25% (1.46)	3.01% (3.03)
Panel 4 (all SSNs with specific notification)	**SSN**	11.44% (.46)	15.74% (.0077)	22.88% (1.66)	24.50% (2.37)	30.59% (4.02)	47.34% (5.46)
	Pop count	3.48% (.40)					
	Age	1.39% (.20)	2.28% (.40)	3.26% (.36)	3.31% (.68)	2.93% (1.36)	10.33% (4.66)
	DOB	1.25% (.23)	2.42% (.51)	2.35% (.58)	1.94% (.51)	4.25% (1.39)	9.50% (4.61)
	Sex	0.75% (.17)	0.82% (.19)	1.20% (.39)	2.06% (.56)	2.93% (1.17)	3.35% (1.85)
	Race	1.94% (.33)	3.28% (.40)	3.74% (.53)	4.94% (.79)	8.00% (1.94)	12.01% (4.95)
	Hispanic Origin	3.24% (.38)	4.40% (.56)	5.33% (.83)	5.01% (1.12)	5.89% (2.40)	1.67% (1.08)
	Reltnshp to P1		0.92% (.21)	1.38% (.38)	0.94% (.40)	1.79% (1.02)	2.51% (1.75)
Panel 5 (general notification)	**Pop count**	2.09% (.29)					
	Age	0.90% (.15)	1.65% (.29)	1.88% (.48)	2.02% (.47)	3.95% (1.60)	5.58% (2.48)
	DOB	0.87% (.18)	1.64% (.25)	1.34% (.31)	1.51% (.37)	2.24% (1.03)	5.58% (2.37)
	Sex	0.41% (.12)	0.48% (.15)	1.16% (.29)	1.67% (.43)	4.45% (1.70)	7.25% (2.55)
	Race	1.58% (.21)	2.71% (.30)	4.72% (.75)	4.48% (.76)	5.95% (1.11)	7.60% (2.31)

	Hispanic Origin	2.22% (.29)	2.26% (.43)	2.91% (.56)	2.92% (.74)	3.75% (1.01)	2.93% (1.00)
	Reltnshp to P1		0.54% (.22)	0.86% (.40)	0.70% (.28)	2.11% (.99)	3.00% (2.17)
Panel 6 (specific notification)	**Pop count**	2.48% (.26)					
	Age	1.20% (.17)	1.34% (.26)	2.36% (.48)	2.33% (.58)	5.67% (1.51)	12.60% (4.79)
	DOB	0.77% (.18)	1.50% (.23)	1.95% (.43)	1.69% (.44)	1.31% (.90)	5.50% (2.89)
	Sex	0.68% (.13)	0.49% (.15)	1.16% (.34)	2.38% (.66)	3.61% (1.04)	6.57% (3.24)
	Race	1.52% (.20)	2.91% (.37)	3.74% (.60)	5.18% (1.00)	7.80% (1.81)	8.16% (2.97)
	Hispanic Origin	2.29% (.26)	2.45% (.38)	4.47% (.68)	3.89% (.71)	4.89% (1.12)	5.94% (2.56)
	Reltnshp to P1		0.87% (.21)	0.93% (.30)	0.99% (.36)	1.01% (.61)	3.28% (2.32)

Table D.2 contains the item nonresponse rates for the total income question for the long form panels. Rates in Table D.2 are computed across households for which the respondent-reported household count is greater than the person number of the item and the person of interest. Additionally, these rates are computed over all households where the person of interest is 15 years old or older (in accordance with census form skip patterns, persons less than 15 years of age skip this question).

Table D.2. Item Nonresponse Rates by Person Number and Panel for Long Form Panels

Panel	Item	Person 1	Person 2	Person 3	Person 4	Person 5	Person 6
LFC	Total Income	26.60% (1.36)	36.19% (1.50)	45.22% (2.23)	53.09% (4.18)	35.79% (5.54)	58.38% (12.60)
Panel 7 (Specific Notification)	Total Income	24.76% (1.05)	37.05% (1.24)	48.15% (2.19)	54.94% (4.37)	48.07% (7.84)	45.60% (17.98)
Panel 8 (General Notification)	Total Income	26.60% (1.16)	38.68% (1.52)	46.51% (3.35)	51.11% (5.80)	49.30% (9.00)	50.97% (20.85)

Table D.3. Statistical Comparisons of Item Non-Response Rates to the Total Income Question for Person 1 on the Long Form

Pairwise Comparison	Overall Difference
LFC - Panel 7 (specific notification)	1.84% (1.89)
LFC - Panel 8 (general notification)	0.00% (1.82)
Panel 7 (specific notification) - Panel 8(general notification)	-1.84% (1.55)

Table E.1. Mail Response Rates (Standard Error) for SSN Request and Control Panels by Strata

Experimental Panel	Full Population	High Coverage Areas	Low Coverage Areas
Short Form Control	73.1% (.70)	75.9% (.83)	60.8% (1.03)
All SSNs (Panel 1)	72.0% (.77)	75.3% (.92)	57.9% (1.01)
One SSN (Panel 2)	71.7% (.77)	75% (.93)	57.4% (1.06)

Table E.2. Mail Response Rates (Standard Errors) for Notification and Control Panels by Strata

Experimental Panel	Full Population	High Coverage Areas	Low Coverage Areas
Short Form Panels:			
Short Form Control	73.1% (.70)	75.9% (.83)	60.8% (1.03)
General Notification (Panel 5)	71.8% (.66)	74.8% (.81)	59% (1.05)
Specific Notification (Panel 6)	73.5% (.72)	76.8% (.86)	59% (1.00)
All SSNs with General Notification (Panel 3)	69.5% (.72)	72.6% (.85)	56.6% (1.09)
All SSNs with Specific Notification (Panel 4)	70% (.76)	73.0% (.91)	56.9% (.98)
Long Form Panels:			
Long Form Control	63.5% (.81)	66.8% (.98)	48.7% (1.02)
General Notification (Panel 8)	62.2% (.80)	66% (.95)	46% (1.04)

Table E.2. Mail Response Rates (Standard Errors) for Notification and Control Panels by Strata

Specific Notification (Panel 7)	63.9% (.81)	67.4% (.98)	48.5% (1.07)