

# MAIL-BACK RESPONSE RATES FOR SIMPLIFIED DECENNIAL CENSUS QUESTIONNAIRE DESIGNS

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The 1990 U.S. Decennial Census required surveying over 100,000,000 households. The primary means of data collection was intended to be a mail-back census form. The 1990 response rate for this mail-back form was 65 percent, ten percentage points lower than the 75 percent response rate obtained in 1980. A consequence of this lower response rate was the necessity of spending an additional \$100,000,000 or perhaps more for personal enumerators to complete the census.

Many explanations have been proposed for why the mail-back response rate declined between 1980 and 1990, based upon analysis of data collected in post-census surveys and anecdotal evidence. The potential explanations range from the design of the census questionnaire itself and concern about privacy, to changes in the composition of U.S. households (Fay et al., 1991, Kulka et al. 1991). Among the many proposed explanations offered from a variety of sources was a perception that perhaps completing even the short form was too great a burden, and that the response rate could be increased by reducing the number of questions contained in it.

These and other concerns related to conduct of the 1990 census, such as overall cost and the differential undercount, have influenced the activities of the Census Bureau's Year 2000 Research and Development Program. Its mission includes developing and evaluating alternative designs for the next decennial census. One of many issues being investigated under this program is whether or not development of a simplified questionnaire will improve mail-back response rates.

In this paper we report results from the 1992 Simplified Questionnaire Test (SQT) designed by the Census Bureau for purposes of determining whether response rates can be improved by asking fewer questions. The experiment was designed in a way that would allow us to also determine if response rates could be improved by the use of "respondent-friendly" design, and if requesting people's social security number has an adverse effect on response. By implementing this experiment in geographic areas with low vs. high response characteristics in the 1990 census and using a particular implementation strategy proposed to improve overall response rates, additional information

could be obtained to aid in the development of alternative census designs for the year 2000.

Selection of the experimental variables and the overall study design took into consideration past mail survey research and special considerations associated with conducting the decennial census. A discussion of this literature has been deleted from this presentation because of space requirements, but is available from the authors.

## EXPERIMENTAL DESIGN

### Experimental Treatments

The overall design of the experiment involved sending five different census forms to a total of 17,000 households in two population strata. One strata consisted of geographic areas from which quite low mailback response rates were obtained in 1990 and the other represented all other areas of the United States. The same implementation strategy was used for all households in the survey sample. Details of the design are described below.

#### TREATMENT ONE--(the CONTROL or 1990 short form)

A nearly exact replication (dates were changed from 1990 to 1992) of the 1990 short form consisting of one page (10-1/2" x 28") printed on both sides folded to 10-1/2" x 5" for insertion into an envelope virtually identical in outward appearance to the one used in 1990, which included in bold letters OFFICIAL 1992 NATIONAL CENSUS TEST. A motivational insert and separate insert providing additional instructions were also included.

#### TREATMENT TWO--(the BOOKLET)

An eight-page respondent-friendly (based on focus group evidence as explained above) form printed as a booklet (8-1/2" x 11") containing all of the same questions as the 1990 short form. However, people only had to list the names of household members once. A letter from the Director of the Census Bureau was printed on the

front page of the form. The envelope did not contain the bold notation on the envelope used for the control form, and was identical to that used for treatments three to five.

#### TREATMENT THREE--(the MICRO)

A one-page (both sides) respondent-friendly form (8-1/2" x 16") containing only five questions (name, age, gender, ethnicity, and race) for each household member and no housing questions. A separate letter from the Director was included with the form.

#### TREATMENT FOUR--(the MICRO/SSN)

Same as the MICRO form except that social security numbers were also asked for each member of the household. A separate letter from the Director was included with the form which contained an additional paragraph explaining the reason for requesting the social security number.

#### TREATMENT FIVE--(the ROSTER)

A 12" x 5-1/2" respondent-friendly form printed on postcard stock with one end folded over to make it only 8-1/2" long. Only names and birth dates for household members were requested. A separate letter from the Director was included with the form.

The four experimental forms were all printed in the same "family" of graphics with a blue background color identifying the spaces where questions were to be answered. All four experimental forms were mailed in the same size (9-1/2" x 6") envelopes.

#### Implementation Strategy

All households, regardless of treatment, were sent a pre-notice letter, mailed on March 23, the census form on March 26, and a thank you/reminder on March 31. A replacement census form was mailed to non-responding households on April 17. It was accompanied by a separate letter indicating that a response had not yet been received from that household. All four mailings were sent by first-class mail. No additional efforts were made to obtain a completed census form.

The combination of pre-notice letter and reminder postcard was chosen in order to achieve contrast between these two mailings. Their arrivals a few days before and a few days after the census form itself was also a deliberate choice. Our goal was to increase the likelihood that household members would open and ultimately complete the census form.

#### Sample Design

The universe for this study consisted of all housing units situated in the questionnaire mail-back areas as identified by the Census Bureau's 1990 Census Address Control File (ACF), associated with the Tape Address Register Areas and Prelist or Update/Leave (UL) addresses. Housing units included in the Post-Enumeration Survey and in the 1990 Research and Experimental samples were excluded from the test, along with all units for which mail could not be delivered in the census.

The 449 district offices areas for the 1990 census were selected as the geographic units to define strata for the test. District offices with a combination of high minority (Black and/or Hispanic origin) population and low 1990 census form return rates made up the first stratum. Due to a high correlation between the minority rate and the 1990 census mail response rate, the stratification objectives were met by simply ranking the district offices by their percent minority population and selecting the 67 district offices with the highest values for the first stratum. The resulting stratum had a combined minority population of about 64 percent and encompassed about 11 percent of all housing units in the census mail-back areas. The second stratum of 382 district offices had a combined minority population of about 15 percent and a cumulative 1990 census mail back response rate approximately 10 percentage points higher than the district offices in the first stratum. The two strata were designated "Lower Response Areas (LRA)" and "Higher Response Areas (HRA)."

A sample of 17,000 housing units was selected with 8500 units in each stratum. Each stratum, in turn, was divided into five equal size panels in order to test the five different census forms. The sample was clustered in order to reduce the sampling variance in the panel-to-panel comparisons. A systematic sample of 1700 housing units was selected from each stratum. For each housing unit selected, four subsequent units were selected. The resulting households in each of the five-unit clusters were randomly allocated to each panel.

#### Calculation of Completion Rates

Strata completion rates were determined by dividing the number of completed census forms returned by the number mailed out less postmaster returns. Because of the census forms being sent to addresses rather than individuals, the postmaster returns consisted almost entirely of non-existent addresses and vacant households. Completion rates can be interpreted as the percent of households thought to have received the form, which

TABLE 1

**SQT FINAL COMPLETION RATES  
NATIONAL AND STRATUM LEVEL ESTIMATES**

SQT Form Type	COMPLETION RATE (%) ESTIMATES			
	National	LRA	HRA	Difference HRA - LRA
<b>1990 Short Form</b>	63.4	45.2	65.8	20.6
<b>BOOKLET</b>	66.8	52.7	68.7	16.0
<b>MICRO</b>	71.4	55.1	73.5	18.4
<b>MICRO/SSN</b>	68.0	48.9	70.5	21.6
<b>ROSTER</b>	70.9	54.6	73.1	18.5

actually filled out and returned it. Strata completion rates were appropriately weighted to determine overall national completion rates.

Standard errors for the national estimates are computed using the stratified jackknife variance procedures. (Wolter, 1985) Standard errors for the within strata estimates were computed using the formula for the simple random sampling jackknife variance procedures. All 90 percent confidence intervals were adjusted using Dunnett's C-procedure for comparing pair-wise contrasts of the test panel estimates (Hochberg and Tambane, 1987). The adjustment insures that all pair-wise comparisons of the true mail completion rates fall within the corresponding estimated intervals 90 percent of the time.

## RESULTS

### Completion Rates

The final SQT completion rate for each questionnaire panel for each strata and at the national level are presented in Table 1 above. The rates ranged from a low of 63.4 percent for the control group which received the 1990 short form (1990SF), to a high of 71.4 percent for the group receiving the respondent friendly MICRO form at the national level. Results differed substantially between the Lower Response Areas, and the Higher Response Areas. Differences between the Lower Response Areas and Higher Response Areas ranged from 16.0 percentage points for the BOOKLET form to a high of 21.6 percentage points for the MICRO/SSN form. Wide differences in the completion rates between these areas were expected and, in a sense, confirm the assumptions upon which selection of the survey strata were based.

### Does Asking Fewer Questions Improve Response?

To answer this question, completion rates for only three of the forms need to be compared. They are the BOOKLET, containing all of the 1990 short form questions, the MICRO, which eliminated the housing questions and two of the personal questions for each household member, and the ROSTER form which asked only for names and birth dates of each household member.

Overall, people were significantly more likely to return both the MICRO and ROSTER forms, compared to the BOOKLET form, the differences being 4.6 and 4.1 percentage points, respectively (Table 2 on the next page) with interval increases indicated from 1.2 to 7.8 percentage points for the MICRO form and .8 to 7.4 percentage points for the ROSTER form. The results for the HRA stratum were similar to the national estimates. No significant improvements were noted for the LRA stratum from asking fewer questions.

There was no evidence of a difference between the completion rates for the MICRO and the ROSTER forms at the national level or by stratum.

### Does a Respondent-Friendly Format Improve Completion Rates?

The two forms relevant to this comparison are the 1990SF and the BOOKLET form. The 1990SF used traditional optical scanning (FOSDIC) construction methods on a single large page, whereas the BOOKLET was constructed in the "respondent friendly" methods. All of the questions were the same, however.

TABLE 2

COMPARISON OF COMPLETION RATES BY SQT FORM TYPE

Experimental Comparisons	Completion Rates (%) and 90% Confidence Intervals (C.I.)					
	National		Lower Response Areas (LRA)		Higher Response Areas (HRA)	
	Difference	90% C.I.	Difference	90% C.I.	Difference	90% C.I.
Comparisons to the 1990 Short Form						
BOOKLET - 1990 SF	3.4	0.0 to 6.8	7.6	<u>3.5 to 11.7</u>	2.9	-0.9 to 6.7
MICRO - 1990 SF	8.0	<u>4.6 to 11.4</u>	10.0	<u>6.0 to 13.9</u>	7.7	<u>3.9 to 11.5</u>
MICRO/SSN - 1990 SF	4.6	<u>1.2 to 8.0</u>	3.7	-0.4 to 7.8	4.7	<u>0.9 to 8.5</u>
ROSTER - 1990 SF	7.5	<u>4.2 to 10.9</u>	9.5	<u>5.5 to 13.5</u>	7.3	<u>3.5 to 11.1</u>
Number of Questions Asked						
MICRO - BOOKLET	4.6	<u>1.2 to 7.8</u>	2.4	-1.7 to 6.4	4.8	<u>1.1 to 8.5</u>
ROSTER - BOOKLET	4.1	<u>0.8 to 7.4</u>	1.9	-2.2 to 6.0	4.4	<u>0.7 to 8.1</u>
ROSTER - MICRO	-0.4	-3.7 to 2.8	-0.5	-4.5 to 3.6	-0.4	-4.0 to 3.2
User Friendliness						
BOOKLET - 1990 SF	3.4	<u>0.0 to 6.8</u>	7.6	<u>3.5 to 11.7</u>	2.9	-0.9 to 6.7
Asking SSN						
MICRO/SSN - MICRO	-3.4	<u>-6.7 to -0.1</u>	-6.2	<u>-10.3 to -2.3</u>	-3.0	-6.7 to 0.8

Underlined C.I.s indicate the difference was statistically significant at  $\alpha = .10$  (9-in-10 chance that the C.I.s will cover the actual differences)

The experimental data indicate that at the national level, the completion rate for the BOOKLET form is no lower than the 1990 short form and could be considerably higher. The range from 0.0 to 6.8 percentage points covers the actual difference.

In the LRA stratum, the BOOKLET form has a higher completion rate—the interval from 3.5 to 11.7 percentage points covering the actual difference. There is no evidence of a difference in the HRA stratum. Hence, by using a user-friendly type form, gains should be realized from within the LRA stratum, but improvements for the remainder of the country could be questionable.

Does the Combination of Respondent-Friendly Format and Asking Fewer Questions Improve Response?

By comparing results for the 1990SF and MICRO forms, we can assess whether combining respondent friendly design with asking fewer questions improves completion rates. It is clear that this combination has a significant positive influence overall and for each of the strata. Completion

rates are 9.9 percentage points higher for the MICRO form in the LRA stratum, 7.7 for the HRA stratum, and 8.0 overall. The interval of 4.6 to 11.4 percentage covers the overall actual difference.

Does Asking for Social Security Numbers Decrease Completion Rates?

Overall, asking for social security numbers decreases completion rates. Whereas the MICRO form achieved an overall completion rate of 71.4 percent, the completion rate for the MICRO/SSN form was 68.0 percent, a difference of 3.4 percentage points, which is significant. A significant and somewhat larger difference of 6.2 percentage points was obtained in the LRA stratum but not in the HRA stratum where the difference was 3.0 percentage points. The estimated losses for the national and LRA stratum confidence intervals range from .1 to 6.7 for the nation and 2.3 to 10.2 percentage points for the LRA stratum.

## How Did the Implementation Strategy Influence Response?

This issue was not addressed experimentally in the present study; identical procedures were used for all treatments. However, general comparisons can be made with previous decennial censuses and test censuses conducted in other years. In addition, estimates can be made of the effect of the replacement mailing by evaluating the daily rates of return.

The results obtained in this test census were substantially higher than those obtained in the 1986 test census, which also used a replacement census form mailing. The completion rate for that test was 49.2 percent vs. 63.4 percent for the equivalent (1990SF) form in this test census. Thus, the implementation strategy used in the 1992 test census of a pre-notice census form, mailing-reminder card, replacement form, achieved a completion rate that was 14.2 percentage points higher.

In order to evaluate the effects of the second mailing on each questionnaire panel, we computed the total number of forms returned after April 17, 1992, until closeout on May 15, 1992, divided by the number of questionnaires sent out in the second mailing. Between 27% and 33.5% of all of the units which received a second mailing returned a questionnaire by closeout. The MICRO form showed a significantly higher proportion of questionnaires returned than the BOOKLET form or the 1990 Census form. The 1990 Short form, MICRO and MICRO/SSN all showed significant lower proportions of the second mailing returned in the LRA stratum compared to the HRA stratum. No other significant differences were noted.

## **CONCLUSIONS AND DISCUSSION OF IMPLICATIONS**

### Number of Questions, Respondent-Friendliness, and Social Security Numbers

Results of this study show that completion of decennial census forms can be modestly improved by asking somewhat fewer questions than was asked on the 1990SF and by respondent-friendly construction methods.

Importantly, however, the shortest form, i.e. the ROSTER, did not achieve the highest response rate in this study. That distinction went to the two-sided one page MICRO form. We conclude that a minimal household roster with birth dates (to facilitate unduplication of household counts) cannot be counted upon to improve response rates beyond those obtained by a form containing at least five questions (in this case name, age, gender, ethnicity, and race) about each household member.

At this point we can only speculate about the reasons. It may be that in a census context, people expect to be asked a certain amount of information about themselves to fulfill the objectives of what a census is all about and,

therefore, any additional advantage of shorter length is counter-balanced by perceptions of being less relevant or useful.

It is also important to note that in the Lower Response Areas, where we expected that obtaining improved response would be especially difficult, that no significant differences among any of the form lengths were observed. Based upon the statistical analysis, we cannot conclude that there would be a response advantage to be achieved by shortening the 1990 form to the size of the MICRO or beyond that to the ROSTER form. However, it is in precisely these areas that the greatest advantage was achieved by respondent-friendly construction. The 7.5 percentage point difference between the booklet and the 1990SF forms (and slightly larger for the others) suggests that "respondent friendliness" is a very promising avenue to pursue for improving census forms for use in traditionally Lower Response Areas.

In addition, the combination of fewer questions and respondent friendly design produced improved response overall and in both the high and low response areas. This combination offers substantial possibilities for improving overall response to the census.

### Limitations of the Study

The primary purpose of the SQT is to compare the final mail completion rates for four alternative short form questionnaire designs to the 1990 Census short form questionnaire in a survey environment. However, the results of this study are limited in their comparative and predictive values to the short form mail response rates in a census setting due to differences in implementation procedures, the sampling frame from which the units were selected and the public environment existing at the time of data collection.

The SQT was conducted in a non-census year without the benefits of the census outreach program and census publicity to influence the final response rates. On the other hand, the SQT procedures utilized a pre-notice letter and a second mailing to increase response. These procedures were not utilized in the 1990 Census. The benefits of these procedures on each of the panels or across strata may not be consistent or provide for a different set of outcomes than those reported here in an actual census environment.

The results of this test reflect improvements in the completion rates resulting from the specific questionnaire designs included in this test and cannot represent the effects that might occur from all possible questionnaires with fewer questions or with a more "respondent-friendly" format. In addition, the benefits of these modified forms are based solely on the improvements in the mail completion rates detected from this study and do not consider issues of data quality, such as item non-response and edit failure.

## Implementation Strategy

In general, we expect that mail-back response rates will be higher during a census year than in the off years when test censuses are conducted. The reason is that the large amount of publicity associated with doing the census, or "census climate" as it is sometimes referred to, will encourage people to respond in greater numbers. Therefore, conclusions about levels and causes of response to a test census must always be stated with full recognition that the results might be different in some unknown way in an actual census. As expected, the completion rates attained in this test are somewhat below those obtained in the 1990 census, but they are also much higher than those obtained in the 1986 test census. At a minimum, we feel they offer promise for improving response rates in the next census and should be investigated further.

The reason for this conclusion rests with two considerations. First, the results achieved by the implementation procedures used for this test are very consistent with the results likely to be achieved in household mail surveys conducted by others. Completion rates over 60 percent have been reported frequently for household surveys which use similar implementation procedures. Second, it is apparent from an examination of the general mail survey literature that, to some extent, "techniques" for improving response can be substituted for one another. The combined effects of using many response-inducing techniques are more than might be obtained by using either of them alone but less than the sum of their individual effects. It is therefore reasonable to speculate that combining a "census climate" with the techniques used here would achieve an overall completion rate higher than that which could be achieved by either when used alone.

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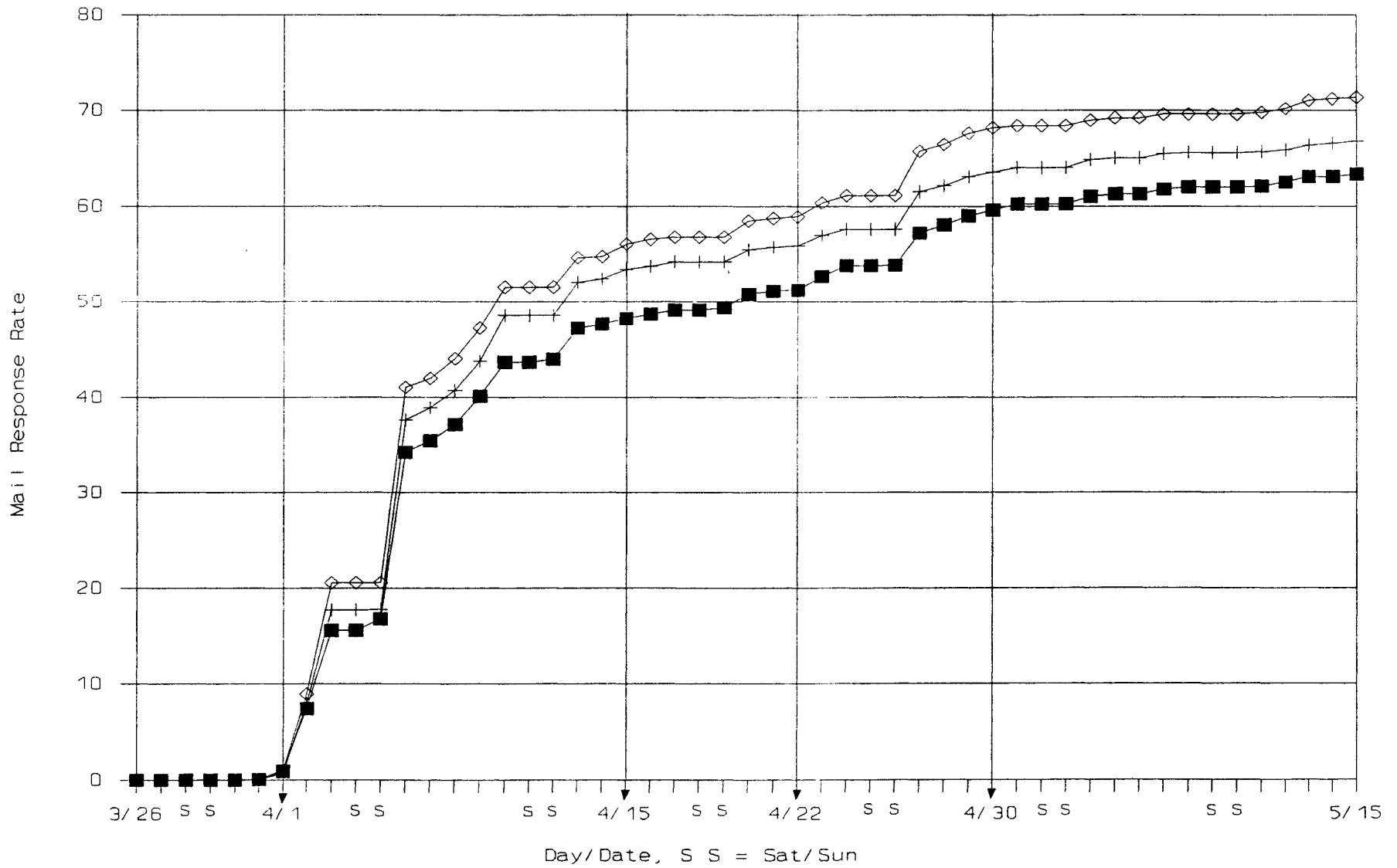
TABLE 3

COMPLETION RATES AND DIFFERENCES IN COMPLETION RATES  
AS OF APRIL 22, 1992 AND AT CLOSEOUT

SQT Form Type	Estimates of Completion Rates and Differences (May 15, 1992 - April 22, 1992) 90 % Confidence Intervals in ( )s								
	National			LRA			HRA		
	4/22	5/15	Diff.	4/22	5/15	Diff.	4/22	5/15	Diff.
1990 Short Form	51.3	63.4	12.1 (10.36 to 13.92)	33.3	45.2	11.9 (9.84 to 13.79)	53.6	65.8	12.2 (10.19 to 14.18)
BOOKLET	55.9	66.8	10.9 (9.18 to 12.57)	41.0	52.7	11.7 (9.80 to 13.74)	57.9	68.7	10.8 (8.86 to 12.66)
MICRO	58.9	71.4	12.5 (10.66 to 14.26)	42.4	55.1	12.7 (10.65 to 14.74)	61.1	73.5	12.4 P(10.42 to 14.45)
MICRO/ SSN	56.7	68.0	11.3 (9.57 to 13.03)	37.4	48.9	11.5 (9.47 to 13.37)	59.2	70.5	11.3 (9.34 to 13.22)
ROSTER	59.7	70.9	11.2 (9.57 to 12.96)	40.1	54.6	14.7 (12.37 to 16.68)	62.2	73.1	*10.9 (8.93 to 12.74)

# CUMULATIVE DAILY MAIL COMPLETION RATES

National Level by SQT Form Type



■ 1990 SF      + Booklet      ◇ Micro