CPS OVERLAP ANALYSIS TEAM TECHNICAL REPORT 3

MODE EFFECTS ANALYSIS OF LABOR FORCE ESTIMATES

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Executive Summary of

CPS OVERLAP ANALYSIS TEAM TECHNICAL REPORT 3

Mode Effects Analysis of Major Labor Force Estimates

April 14, 1994

To investigate the possible influence of changes in collection mode on major labor force estimates, special studies were embedded in the CPS and the Parallel Survey. These studies were designed to examine four potential sources of difference: centralized telephone interviewing, centralized telephone interviewing combined with computer-assisted interviewing, questionnaire (given centralized telephone interviewing), and the new questionnaire designed for computer-assisted interviewing. Highlights of the results are:

I. **Centralized telephone interviewing** effects

Some evidence that this effect exists for

- Total unemployment rate (marginally significant)
- Total black and black male unemployment rates

II. **Centralized and computer-assisted telephone interviewing** effects

Some evidence that this effect exists for

- Total, total female, and total male unemployment rates
- Total white, white female, and white male unemployment rates
- Black female unemployment rate

III. **Questionnaire, given centralized telephone interviewing**, effects

Some evidence that this effect exists for

- Total female unemployment rate (marginally significant)
- Total black and black female unemployment rates

IV. **New Questionnaire designed for computer-assisted interviewing** effects

Some evidence that this effect exists for

- Total, total male, and total female unemployment rates
- Total white, white male, and white female unemployment rates
- Total black, black male, and black female unemployment rates
- Total female and white female CLF participation rate

These results are presented with qualifications. The first three effects were investigated using subnational estimates. The fourth effect, the new questionnaire designed for computer-assisted interviewing, does use national estimates, but only a quarter of the total sample. In general, the sample sizes for these studies are small, particularly for the centralization effect. Few attempts were made to adjust for multiple comparisons within tests. When considered jointly, the overall confidence level decreases substantially.

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Introduction

The official monthly civilian labor force estimates from January 1994 onward are based on data from a comprehensively redesigned Current Population Survey (CPS). The redesign incorporates changes in the basic questionnaire and collection methodology. Bregger and Dippo (1993) discuss the motivation for this redesign.

To gauge the effect of the CPS redesign on published estimates, a Parallel Survey (PS) was conducted using the new questionnaire and collection procedures from July 1992 to December 1993. Annual average estimates from the PS were used to examine the effect of the CPS redesign on major labor force estimates. Polivka (1994) presents a comparison of the labor force estimates from the PS and CPS during 1993. Kostanich and Cahoon (1994) further consider the possible influence of the differences in the two surveys' designs on these comparisons.

A secondary consideration was an investigation into the possible effect of selected factors associated with the new questionnaire or collection mode on major labor force estimates. Special studies were embedded within the CPS and the PS during the same time period to provide data for testing hypotheses about the effects of these methodological differences on labor force estimates. The resultant hypothesis tests attempted to link the differences in annual average major labor force estimates between CPS and the PS to the presence of specified collection mode differences.

This report centers on four possible effects: two centralized telephone interviewing effects and two new questionnaire effects. Three of the four hypothesis tests used subnational estimates of CPS and PS data and were not necessarily representative of the national differences. The other hypothesis test used national estimates computed from approximately one fourth of the full sample (for both surveys).

The **Background** section of this report provides an overview of the two surveys' designs, a description of the estimates and variance estimates, descriptions of hypothesis testing methodology, and detailed descriptions of the tested hypotheses. The **Results** section presents the hypothesis tests for major labor force characteristics. The **Summary** section provides general conclusions.

Background

I. Sample Design

The CPS is a monthly survey of 60,000 eligible households. These households are selected to represent the population of the Nation and of each State. The probability sample of housing units is drawn using a multistage stratification procedure. The sampled households are located in 729 selected geographic areas. The largest metropolitan areas within each State are always included; the remaining areas of a State are sampled with probability of selection proportionate to the population of the area[1]. The sample is designed to provide a 1.7 percent monthly coefficient of variation[2] on the estimated national unemployment rate, assuming a 6 percent rate. It was also designed to meet specific reliability criteria for the monthly level of unemployment for 11 States; the remaining 39 have fixed levels of reliability for an annual average. At the national level, this means that a month-to-month change of 0.2 percentage point in the estimated unemployment rate is significant at a 90-percent confidence level.

The sample design for the Parallel Survey (PS) was based on that of the National Crime Victimization Survey (NCVS), which is conducted by the Bureau of the Census for the Bureau of Justice Statistics. The PS was a monthly survey of 12,000 eligible households. The major purpose of the PS was to measure effects on major labor force estimates at the national level. Consequently, these households were selected to be nationally representative; the sample within a State was not necessarily representative of that State's population. The probability sample of housing units was drawn using a multistage stratification procedure. The sampled households for the PS were located in 283 geographic areas. The monthly coefficient of variation for the estimated national unemployment rate from the PS was 3.5 percent, assuming a 6 percent rate.

II. Data Collection Design

In an effort to balance respondent burden with improved estimates of change, households are interviewed for 4 consecutive months, not interviewed for the next 8 consecutive months, and then interviewed for another 4 consecutive months. Each month, a new household panel of approximately one-eighth the total monthly sample size (60,000/8 = 7,500 households for the CPS and 12,000/8 = 1,500 for the PS) is initiated, and the panel which received its eighth interview the previous month is dropped. Thus, each month,

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[1] Following each decennial census, a new sample of areas is selected. The current sample is based on the 1980 decennial census.

[2] The coefficient of variation of an estimate is defined as the standard error of the estimate divided by the estimate.

eight different panels are being interviewed for the 1st, 2nd,..., and 8th time. This rotating panel structure means that three-quarters of the sample in a given month is retained in the sample the next month, improving the estimates of month-to-month change. However, since the PS was initiated in 1992, and it takes 16 months to phase in this type of rotation scheme, September 1993 was the first month in which the rotation scheme was completely in place. In both the CPS and the PS, first and fifth month-in-sample households are interviewed through personal visits. For subsequent months, the majority of interviews are conducted by telephone.

Prior to January 1994, most of the CPS data were collected with a paper survey instrument and translated into computer readable form using FOSDIC[3] technology. Approximately 9 percent of the data was collected by interviewers working in two centralized facilities using computer-assisted telephone interviewing. Only households in a subset of the CPS sample areas were eligible for centralized computer-assisted telephone interviewing (CATI). These areas were purposely chosen based on operational considerations and were generally large metropolitan areas.

Centralized computer-assisted telephone interviewing had been used in the CPS since January 1989, when a centralized facility in Hagerstown, Maryland, was opened. In order to minimize any potential effects on published CPS estimates, the percent of sample cases interviewed from CATI was originally kept small. Over the 5-year time period, the percent of the CPS sample interviewed from CATI gradually increased to the 9 percent level used in the 1993 CPS[4].

From January 1991 through December 1992, the Bureau of the Census and the Bureau of Labor Statistics jointly conducted a special study in the CPS CATI-eligible areas to measure the effects of centralized telephone interviewing combined with computer-assisted interviewing on CPS data. Findings from this study showed that inclusion of CATI produced a 0.8 percentage point higher unemployment rate (Shoemaker, 1993). However, this difference could not be attributed to CATI alone. The paper-and-pencil

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[3] Film Optical Sensing Device for Input to Computers.

[4] To accommodate the increased CATI sample, a second telephone facility was opened in Tucson, Arizona, in 1992.

questionnaire itself was not administered from a centralized location; rather, it was a computerized version, with modified wording of the lead-in question to the labor force section[5]. Thus, it was impossible to distinguish whether this difference was due to centralization, computer-assisted interviewing, or a slightly modified questionnaire.

All the data for the PS were collected using computer-assisted interviewing. Eighty-two percent of the data were collected by field representatives using laptop computers, either during personal visits to respondents' homes or by telephone from their own homes. The remaining 18 percent of the data were collected using computer-assisted telephone interviewing by a separate staff of interviewers working in the same two centralized facilities used for the CPS. This CATI interviewing was conducted in a subset of the PS sample referred to as the PS CATI-eligible areas. Select multi-interviewer sample areas were CATI-eligible in the PS.

III. Hypotheses and Experimental Design

This analysis is a contrast study. To study the effect of a possible "treatment," a sample was randomly split into two "independent" groups (split panels). Each panel is statistically representative of the parent sample. The treatment is administered to respondents in one of the two split panels. The treatment is excluded from the other panel. The difference between the estimates from the two panels gives an estimated difference of the "treatment effect."

The following terms are used throughout this report:

CATI **Centralized Computer-Assisted Telephone Interviewing**. Interviews are conducted from a **centralized** telephone facility using a fully automated version of either questionnaire (old or redesigned). A respondent interviewed from the telephone facility rarely has the same interviewer twice. This is **centralized** interviewing.

PAPI **Pencil-and-Paper Interviewing (Personal Visit or Telephone).** Interviews are conducted using the old pencil-and-paper questionnaire. In general, a respondent is interviewed by the same field representative for all eight interviews, either by personal visit or by telephone. This is **decentralized** interviewing.

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[5] See Rothgeb (1994) for a more detailed discussion of the lead-in question and possible influences of computer-assisted interviewing and centralization.

CAPI **Computer-Assisted Personal Interviewing (Personal Visit or Telephone)**. Interviews are conducted with the redesigned questionnaire using a laptop computer. As with PAPI, in general the respondent is interviewed by the same field representative for all eight interviews, either by personal visit or by telephone. This is **decentralized** interviewing.

MIS **Month in Sample**. This refers to the number of months that a housing unit has been in sample. This is usually the same as the number of interviews that a household has undergone. For example, MIS 1 refers to the first interview. MIS 1 and MIS 5 interviews are always conducted by personal visit.

CATI Panel Households in this type of panel are eligible for interview at one of the centralized telephone facilities. Not all households in the panel will be interviewed by CATI. To be interviewed by CATI, a respondent must have a telephone and speak English or Spanish. More important, during the personal visit interviews (usually MIS 1 and MIS 5) the household must agree to be interviewed in subsequent months by telephone. If not, the household's subsequent interviews will be completed by a field representative, either by personal visit or by telephone. Generally, if the household has not been interviewed from a centralized telephone facility by mid-week, then the interview is transferred to a field representative for interviewing.

Three of the four hypotheses are tested using CATI panels.

NonCATI Panel All households in this type of panel are ineligible for CATI interviewing. Thus, even if a household meets all of the basic requirements for CATI, the interview will be completed by a field representative (decentralized interviewing only).

Three of the four hypotheses are tested using NonCATI panels.

Automation An **automated** questionnaire is fully computerized. This means that an interviewer does not have to decide which question should be asked next. That is, after entering a response to a question, the next question will appear on the screen automatically. Both **CAPI** and **CATI** are fully automated.

The analysis here centers on four possible effects: two centralized telephone interviewing (CATI) effects and two new questionnaire effects. These are not the only mode effects that could be present. For example, one would test for an automation

effect, but this was impossible, because a CAPI version of the old questionnaire was never introduced into CPS.

A description of the hypotheses follows. More detailed descriptions are provided in Bureau of the Census (1993). Following standard procedures, hypotheses are stated in terms of no effect. The statistical testing is performed to determine if there is sufficient evidence present to reject these stated hypotheses.

A. Hypothesis One: No centralized telephone interviewing effect

1. Description

Tests of these hypotheses are based on data from the PS which used the new redesigned questionnaire. The same automated questionnaire was used by both the PS field representatives (decentralized interviewing) and by the PS CATI interviewers (centralized interviewing).

With decentralized interviewing, most respondents are interviewed for eight months by the same field representative, either by personal visit or by telephone. This allows the respondent to develop a personal rapport with the interviewer and may also result in both field representative and respondent conditioning. With CATI, however, the first and fifth interviews are conducted by a field representative, and the subsequent three interviews are conducted from a **centralized** telephone facility. Thus, personal rapport can never be developed, nor can the interviewer be conditioned to expect certain responses. Interviewers at the centralized facilities have the benefit of closer supervision and interaction with other interviewers, but, in general, they have considerably less experience than their field counterparts. See Rothgeb (1994) for more detailed discussion of the differences in interviewer and respondent rapport seen in decentralized and centralized interviewing.

2. Experimental Design

The sample within the PS CATI-eligible areas was randomly split into two representative panels: Panel A (PS CATI) and Panel B (PS NonCATI). Households in Panel A could (not must) be sent to CATI for interviewing, but not all cases were completed using CATI. Households in Panel B could not be sent to CATI.

Because both panels were from a non-probability group of sample areas, these panel estimates were **not** nationally representative. PS CATI-eligible areas were generally very urban and had different demographic characteristics from overall national demographics. For example, 1990

census counts show that approximately 12 percent of the civilian, non-institutional population aged 16 or older is black; approximately 8 1/2 percent of the population is Hispanic. The population covered by the PS CATI-eligible area was approximately 13 percent black and 12 percent Hispanic.

Data obtained from the first and fifth (personal visit) interviews, were excluded from the panel estimates for testing this hypothesis. Approximate monthly sample sizes of persons 16+, civilian labor force (CLF) participants, and unemployed persons for each panel are presented below.

PS Panel	Persons 16+	CLF participants	Unemployed persons
PS CATI Panel A	7,800	5,180	420
PS NonCATI Panel B	950	630	50

3. Limitations

The composition of the split panels was the major limitation of this analysis. When the sample was randomly split into two groups, only one-tenth of the sample was assigned to the Panel B (NonCATI) group. This resulted in extremely variable Panel B estimates.

The confounding caused by having a mix of data from both CATI and non-CATI interviews in the Panel A estimates was a second limitation. Restricting the estimates to data from MIS 2-4 and 6-8 sample units reduced this effect but did not eliminate it. As mentioned above, not all of the CATI-eligible interviews were actually completed at a CATI facility: Some of the households in the CATI panel did not have telephones; some did not have the English or Spanish skills necessary for telephone interviewing; and some could not be reached by telephone from the centralized facility. Non-CATI cases were included in the CATI panel estimates to avoid biasing the sample.

B. Hypothesis Two: No centralized and computer-assisted telephone interviewing effect

1. Description

Tests of these hypotheses are based on data from the CPS. The PAPI questionnaire was used by the CPS field representatives (decentralized interviewing). A computerized version of the *old questionnaire* with a slightly modified wording of the lead-in labor force question was used by the CPS CATI interviewers (centralized and computer-assisted interviewing). In contrast to the hypothesis described above, this centralized telephone interviewing effect was combined with computer-assisted interviewing, because the old questionnaire did not have a computerized version outside of the CATI environment. This study was a continuation of the study presented in Shoemaker (1993).

2. Experimental Design

The sample within the CPS CATI-eligible areas was randomly split into two representative panels: CATI-eligible (Panel C) or nonCATI (Panel D). The number of households in Panel C each month increased over time. Thus, the composition of both panels changed on a monthly basis. The only areas included in this study were those that had sample in both Panel C and Panel D.

As with the first hypothesis, these panel estimates were **not** nationally representative, because they used data from a non-random group of sample areas. Moreover, the geographic areas represented in this study are different than those included in hypothesis one. The population covered by the CPS CATI-eligible sample areas was approximately 12 percent black and 11 percent Hispanic.

Data obtained from the first and fifth interviews were excluded from the panel estimates for testing this hypothesis. Approximate monthly sample sizes of persons 16+, CLF participants, and unemployed persons for each panel are presented below.

CPS Panel	Persons 16+	CLF participants	Unemployed persons
CPS CATI Panel C	14,580	9,800	730
CPS NonCATI Panel D	16,250	10,840	740

3. Limitations

The confounding caused by the mix of CATI and non-CATI interviews in the CATI Panel C estimates was also present in these tests. Additionally,

the Panel C interviews which were not completed at a CATI facility were conducted with a slightly different wording of the lead-in labor force question.

C. Hypothesis Three: No new questionnaire, given centralized telephone interviewing effect

1. Description

Tests of these hypotheses are based on data from both the PS and CPS CATI-eligible panels. From October 1992 through December 1993, there were two fully automated questionnaires used in the CATI facilities -- the old questionnaire and the redesigned questionnaire. The fully automated redesigned questionnaire was used by both the PS interviewers at the centralized telephone facilities and by the PS field representatives. The automated version of the old CPS questionnaire described in hypothesis two was used by the CPS interviewers at the centralized telephone facilities, whereas the PAPI questionnaire was used by the CPS field representatives.

2. Experimental Design

The sample for this analysis is confined to an even smaller subnational area: the intersection of the PS CATI-eligible areas and the CPS CATI-eligible areas (prior to January 1994). This area is referred to as the "Common CATI-eligible area." Again, these panel estimates were **not** nationally representative. The population covered by the Common CATI-eligible area was approximately 13 percent black and 13 percent Hispanic.

Estimates from the PS CATI-eligible Panel in the Common CATI-eligible area (Panel E) were compared to estimates from the CPS CATI-eligible Panel in the Common CATI-eligible area (Panel F).

Data obtained from the first and fifth interviews were excluded from the panel estimates for testing this hypothesis. Approximate monthly sample sizes of persons 16+, CLF participants, and unemployed persons for each panel are presented below.

Common PSU Panel	Persons 16+	CLF participants	Unemployed persons
PS CATI Panel E	5,790	3,910	320
CPS CATI Panel F	13,130	8,540	680

3. Limitations

There were two primary confounding "nuisance" effects:

- Both panels included interviews that were not completed at a CATI facility, so some decentralized interviews were unavoidably included in the panel estimates;

- Moreover, the nonCATI PS cases were completed with CAPI, and the nonCATI cases in CPS were completed with PAPI.

D. Hypothesis Four: No new questionnaire designed for computer-assisted interviewing effect

1. Description

Tests of these hypotheses are based on data from the PS and the CPS in a decentralized environment. The redesigned fully automated questionnaire was used by the PS field representatives. The old PAPI questionnaire was used by the CPS field representatives. The automated CPS questionnaire exists only as a computerized instrument, and the automated design allows complicated skip patterns and dependent interviewing. The rewording of many of the questions (especially the lead-in) is tied to the automation. The old paper questionnaire had far less complicated skip patterns and did not allow for dependent interviewing (Rothgeb, 1994).

2. Experimental Design

The sample for this analysis was a quarter of the total national sample for both the PS and the CPS. NonCATI Panel G consisted of all MIS 1 and MIS 5 PS cases. NonCATI Panel H consisted of all MIS 1 and MIS 5 CPS cases. Thus, these estimates were nationally representative. Moreover, this test was free from any confounding effect that would be directly due to CATI, since first and fifth month interviews were never conducted from a centralized telephone facility.

Approximate monthly sample sizes of persons 16+, CLF participants, and unemployed persons for each panel are presented below.

Panel	Persons 16+	CLF participants	Unemployed persons
PS NonCATI Panel G	6,300	4,220	320
CPS NonCATI Panel H	31,500	21,110	1,580

3. Limitations

The reliability of the test is still not comparable to tests which use all eight interviews' data, because it is only one-fourth the sample size. Additionally, the expected value of an estimate varies depending on the number of months it has been in sample.

IV. Estimation and Variance Estimates for Mode Effects Analysis

Because the estimates for testing the two centralized telephone interviewing hypotheses and the questionnaire (given centralized telephone interviewing) hypotheses were restricted to sample in CATI Eligible PSUs, they were not nationally representative. Each panel estimate was an "unbiased" estimate. That is, the weights used to produce the estimates were strictly a function of the probability of selection (baseweight x adjustment factor for field subsampling x an adjustment factor for the probability of inclusion in a split panel). Variances were computed with localized generalized variance functions (LGVFs). For more details on variance and estimation, see Fisher et al (1993).

Estimates based on final weights were used in testing for a new questionnaire designed for computer-assisted interviewing effect. Final weights were derived from a post-stratification to 1980 census-based population estimates. See Fisher et al (1993) for a detailed explanation of the post-stratification used. Estimates using final weights are considerably more precise than the unbiased estimates and have a different expected value.

V. Testing Methodology

A. Two Sample T-Tests and Bonferroni Multiple Comparisons Tests

The tests discussed in the results section are two-sample t-tests, with a 90 percent confidence level. These confidence levels reflect the individual test; they do not express confidence in the joint family of tests. No attempts have been made to estimate the power of the tests.

Bonferroni multiple comparisons tests were performed for each "significant" individual test. For the purposes of this analysis, each hypothesis is considered to have four "independent" statistics for race/sex breakdown: white men, white women, black men, and black women. Unemployment rate and employment-to-population ratio comparisons are considered independent (but not CLF participation rate, since it is a linear combination of the two). To have **joint** 90 percent confidence, at <u>least</u> one of the p-values must be smaller than 0.025. The multiple comparisons tests are more appropriate for drawing general conclusions about a mode effect, even though they cannot pinpoint individual differences. Bureau of the Census (1994) provides further details on these tests.

B. Implied Comparison Tests

Two types of implied comparison tests were performed for each rejected hypothesis test. These tests are two-sided t-tests, at the 90 percent confidence level. Unless directly noted in the text, the implied comparison tests' results are not significant.

To understand the implied comparison tests, define

$TUER_T$ = *Treatment panel total unemployment rate*

$TUER_{NT}$ = *Non-treatment panel total unemployment rate*

$BUER_T$ = *Treatment panel black unemployment rate*

$BUER_{NT}$ = *Non-treatment panel black unemployment Rate*

$WUER_T$ = *Treatment panel white unemployment rate*

$WUER_{NT}$ = *Non-treatment panel white unemployment rate*

The first set of implied comparison tests are used for the hypothesis that the mode effect in a subpopulation is the same as seen in the parent population. For example, the test of the implied comparison between total and total black unemployment rate is

Install Equation Editor and double-click here to view equation.

These implied comparison tests are performed for:

Subpopulation	Tested Against
Total male	Total
Total female	Total
Total black	Total
Black male	Total black
Black female	Total black
Total white	Total
White male	Total white
White female	Total white

The second set of implied comparison tests are used for the hypothesis that the mode effect has a differential effect on two mutually exclusive subpopulations. For example, the test of the implied comparison between black and white unemployment rates is

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These implied comparison tests are performed for:

Subpopulation	Tested Against
Total male	Total female
Total black	Total white
Black male	White male, black female
Black female	White female, black male
White male	Black male, white female
White female	Black female, white male

Results

This section presents highlights from the four sets of hypothesis tests for major labor force characteristics. The significance level for an individual test is 0.10.

All estimates presented are percentages. Estimated differences may not agree with the table's estimates because of rounding.

I. Centralized telephone interviewing effect

Tests are based on estimated differences between the PS CATI Panel A and the PS NonCATI Panel B. A significant **positive** difference implies that centralized telephone interviewing results in a **larger** rate; a significant **negative** difference implies that centralized telephone interviewing results in a **smaller** rate.

Results from the individual two-sample t-tests are provided in tables A-1 through A-3. These statistics are computed from an average of 14 months of data (October 1992 through December 1993 PS, excluding the March 1993 data because one of the centralized telephone facilities was partially shut down during interview week because of the blizzard of 1993). Results from the Bonferroni tests are provided in Table A-4.

None of the implied comparison tests yielded significant results. That is, there is no evidence, based on these panel estimates, that centralized telephone interviewing differently affects the unemployment rate, employment-to-population ratio, or CLF participation rate by race or sex.

By labor force characteristic, these tests show:

- **Unemployment rate**. The estimated difference for total unemployment rate (1.10 percentage points) was marginally significant (p-value=0.11). Neither the estimated difference for total male unemployment rate nor the estimated difference for total female unemployment rate were significant.

  These tests did not provide any evidence of a centralization effect for white unemployment rate (total, male, female).

  A 90 percent confidence interval on the estimated difference for total black unemployment rate (3.50 percentage points) is given by (0.01, 6.99), indicating that centralized telephone interviewing yields a larger unemployment rate for blacks. The same conclusion can be drawn for black male unemployment rate (3.69 percentage points, with a p-value=0.07), although not for black female unemployment rate (p-value=0.21). The joint comparison for unemployment rate does not reinforce this conclusion. The smallest p-value contained in Table A-4

for the unemployment rate is 0.07, and therefore this joint confidence interval does not contain at least one p-value less than 0.025, the minimum necessary for 90 percent joint confidence.

- **Employment-to-population ratio.** These tests did not provide any evidence of a centralized telephone interviewing effect for employment to population ratio for any race or sex breakdown.

- **CLF participation rate.** These tests did not provide any evidence of a centralized telephone interviewing effect for CLF participation rate for any race or sex breakdown.

II. Centralized telephone and computer-assisted interviewing effect

Tests are based on estimated differences between the CPS CATI Panel C and the CPS NonCATI Panel D. A significant **positive** difference implies that centralized telephone and computer-assisted interviewing results in a **larger** rate; a significant **negative** difference implies that centralized telephone and computer-assisted interviewing results in a **smaller** rate.

Results from the individual two-sample t-tests are provided in tables B-1 through B-3. These statistics are computed from an average of fourteen months of data (October 1992 through December 1993 CPS data, excluding the March 1993 data). Results from the Bonferroni tests are provided in table B-4.

None of the implied comparison tests yielded significant results. That is, there is no evidence, based on these panel estimates, that centralized telephone and computer-assisted interviewing differently affects the unemployment rate, employment-to-population ratio, or CLF participation rate by race or sex.

By labor force characteristic, these tests show:

- **Unemployment rate.** The 90 percent confidence interval on the estimated difference for total unemployment rate (1.00 percentage point) is given by (0.59, 1.41), indicating that centralized telephone and computer-assisted interviewing yields a larger unemployment rate. The same conclusion can be drawn for total female unemployment rate (0.96 percentage point, with a p-value=0.00) and for total male unemployment rate (1.04 percentage points, with a p-value=0.00). These conclusions all hold at the 99 percent confidence level.

  Moreover, the 90 percent confidence interval on the estimated difference for total white unemployment rate (1.07 percentage points) is given by (0.76, 1.38), indicating that centralized telephone interviewing and computer-assisted interviewing yields a larger unemployment rate for whites. The same conclusion

can be drawn for white female unemployment rate (1.03 percentage points, with a p-value=0.00) and for white male unemployment rate (1.11 percentage points, with a p-value=0.00). These conclusions all hold at the 99 percent confidence level.

Finally, a 90 percent confidence interval on the estimated difference for black female unemployment rate (1.86 percentage points) is given by (0.35, 3.37), indicating that centralized telephone and computer-assisted interviewing yields a larger unemployment rate for black females. Neither the estimated difference for total black unemployment rate nor the estimated difference for black male unemployment rate were significant.

The above results are reinforced by the joint comparison for unemployment rate presented in table B-4, because two of the four p-values contained in the Bonferroni confidence interval are smaller than 0.025.

- **Employment-to-population ratio.** These tests did not provide any evidence of a centralized telephone and computer-assisted interviewing effect for employment to population ratio for any race or sex breakdown.

- **CLF participation rate.** These tests did not provide any evidence of a centralized telephone and computer-assisted interviewing effect for CLF participation rate for any race or sex breakdown.

III. New questionnaire, given centralized telephone interviewing effect

Tests are based on estimated differences between the PS CATI Panel E and the CPS CATI Panel F. A significant **positive** difference implies that the new questionnaire, given centralized telephone interviewing results in a **larger** rate; a significant **negative** difference implies that the new questionnaire, given centralized telephone interviewing results in a **smaller** rate.

Results from the individual two-sample t-tests are provided in tables C-1 through C-3. These statistics are computed from an average of 14 months of data (October 1992 through December 1993 Common PSU data, excluding March 1993 data). The Bonferroni tests are provided in table C-4.

None of the implied comparison tests yielded significant results. That is, there is no evidence, based on these panel estimates, that the new questionnaire, given centralized telephone interviewing differently affects the unemployment rate, employment-to-population ratio, or CLF participation rate by race or sex.

By labor force characteristic, these tests show:

- **Unemployment rate.** These tests did not provide any evidence of a questionnaire effect for either total or total male unemployment rate, although the test for total female unemployment rate was marginally significant (0.52 percentage point, with a p-value=0.11).

  These tests did not provide any evidence of a questionnaire effect for white unemployment rate (total, male, female).

  A 90 percent confidence interval on the estimated difference for total black unemployment rate (1.38 percentage points) is given by (0.10, 2.66), indicating that the new questionnaire yields a larger unemployment rate for total blacks (p-value=0.07). The same conclusion can be drawn for black female unemployment rate (1.96 percentage points, with a p-value=0.03), but not for black male unemployment rate (p-value=0.31). These conclusions reinforce the independently-drawn conclusions for these statistics using the full set of CPS and PS data (Polivka, 1994). The joint comparison presented in table C-4 does not, however, reinforce this conclusion of a questionnaire effect, because the smallest p-value in the joint confidence interval is 0.03 and its unrounded value is greater than 0.025.

- **Employment-to-population ratio.** These tests did not provide any evidence of a questionnaire effect for employment to population ratio for any race or sex breakdown.

- **CLF participation rate.** These tests did not provide any evidence of a questionnaire effect for CLF participation rate for any race or sex breakdown.

IV. New questionnaire designed for computer-assisted interviewing effect

Tests are based on estimated differences between the PS NonCATI Panel G and the CPS NonCATI Panel H. A significant **positive** difference implies that the new questionnaire results in a **larger** rate; a significant **negative** difference implies that the new questionnaire results in a **smaller** rate.

Results from the individual two-sample t-tests are provided in tables D-1 through D-3. These statistics are computed from an average of a year's (January 1993 through December 1993) MIS 1 and MIS 5 CPS and PS data. These statistics include the March 1993 data.

Except where noted, none of the implied comparison tests yielded significant results.

By labor force characteristic, these tests show:

- **Unemployment rate.** A 90 percent confidence interval on the estimated difference for total unemployment rate (0.64 percentage points) is given by (0.33, 0.97), indicating that the new questionnaire designed for computer-assisted interviewing yields a larger unemployment rate (p-value=0.00). The same conclusion can be drawn for total male unemployment rate (0.52 percentage points, with a p-value=0.01) and total female unemployment rate (0.79 percentage points, with a p-value=0.01). The relative increase for total female unemployment rate between panels (1.12) is statistically larger than the relative increase (1.07) for total male unemployment rate (p-value=0.08).

  Moreover, the 90 percent confidence interval on the estimated difference for total white unemployment rate (0.49 percentage points) is given by (0.18, 0.80), indicating the new questionnaire designed for computer-assisted interviewing yields a larger unemployment rate for total whites (p-value=0.01). The same conclusion can be drawn for white male unemployment rate (0.39 percentage points, with a p-value of 0.04) and for white female unemployment rate (0.61 percentage points, with a p-value=0.00).

  Finally, a 90 percent confidence interval on the estimated difference for total black unemployment rate (1.63 percentage points) is given by (0.40, 2.86), indicating that the new questionnaire designed for computer-assisted interviewing yields a larger unemployment rate for total blacks. The same conclusions can be drawn for black male unemployment rate (1.50 percentage points, with a p-value=0.08) and for black female unemployment rate (1.83 percentage points, with a p-value of 0.04).

  The above results are reinforced by the joint comparison for unemployment rate presented in table D-4 because one of the p-values contained in the Bonferroni confidence interval is less than 0.025.

- **Employment-to-population ratio.** These tests did not provide any evidence of a new questionnaire designed for computer-assisted interviewing effect for employment to population ratio for any race or sex breakdown.

- **CLF participation rate.** These tests did not provide any evidence of a new questionnaire designed for computer-assisted interviewing effect for either total or total male CLF participation rate. However, a 90 percent confidence interval on the estimated difference for females (1.11 percentage points) is given by (0.25, 1.97), indicating that the new questionnaire designed for computer-assisted interviewing yields a larger CLF participation rate. The relative increase for total female CLF participation rate between panels (1.02) is statistically larger than the relative decrease (1.00) for total male CLF participation rate (p-value=0.02).

These tests did not provide any evidence of a new questionnaire designed for computer-assisted interviewing effect for either total white or white male CLF participation rate. However, a 90 percent confidence interval on the estimated difference for white female (1.1 percentage points) is given by (0.24, 1.96), indicating that the new questionnaire designed for computer-assisted interviewing yields a larger CLF participation rate for white females. The relative increase for white female CLF participation rate between panels (1.02) is statistically larger than the corresponding relative decrease (1.00) for white male CLF participation rate (p-value=0.00).

These tests did not provide any evidence of a new questionnaire designed for computer-assisted interviewing effect for black CLF participation rate (total, male, female).

Summary

This study presents strong evidence of a centralized telephone and computer-assisted interviewing effect on unemployment rate. It also presents equally convincing evidence of a new questionnaire designed for computer-assisted interviewing effect on unemployment rate. This study does not present as convincing evidence of either a centralized telephone interviewing effect or a questionnaire effect using centralized telephone interviewing. However, we would strongly advise against dismissing the possibility of a centralized telephone interviewing effect, given the abundance of evidence of a centralized telephone and computer-assisted interviewing effect presented here and in Shoemaker (1993).

For both the centralized telephone interviewing and computer-assisted interviewing effect and the new questionnaire designed for computer-assisted interviewing effect, it is impossible to separate the effect of computer-assisted interviewing from the respective combined effect. Furthermore, with the exception of the new questionnaire designed for computer-assisted interviewing effect, the studied mode effects are confounded. Ergo, including the centralized telephone and computer-assisted interviewing or the new questionnaire designed for computer-assisted interviewing yields a larger unemployment rate.

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Table A-1

EFFECT OF CENTRALIZED TELEPHONE INTERVIEWING

Unemployment Rate
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	PS CATI Panel A	PS NonCATI Panel B	Difference A-B	P-value
Total	7.88	6.79	1.10	0.11
Men	7.94	6.78	1.17	0.21
Women	7.81	6.80	1.01	0.14
White	6.70	6.29	0.41	.40
Men	6.91	6.48	0.43	.59
Women	6.46	6.07	0.39	.52
Black	15.16	11.67	3.50	0.10*
Men	15.60	11.92	3.69	0.07*
Women	14.82	11.45	3.37	0.21

PS CATI Panel A = PS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with laptop computers (CAPI).

PS NonCATI Panel B = PS sample that cannot be sent to CATI. All sample interviewed with laptop computers (CAPI).

MIS 1 and MIS 5 not included in Panel A or Panel B.

*Differences significant at the 10% level.

Table A-2

EFFECT OF CENTRALIZED TELEPHONE INTERVIEWING

Employment to Population Ratio
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	PS CATI Panel A	PS NonCATI Panel B	Difference A-B	P-value
Total	61.89	62.10	-0.22	0.94
Men	69.57	70.33	-0.77	0.83
Women	55.17	54.95	0.22	0.93
White	63.38	63.30	0.08	0.98
Men	71.38	71.64	-0.26	0.95
Women	56.13	55.86	0.27	0.93
Black	52.84	50.91	1.92	0.88
Men	56.21	55.08	1.13	0.93
Women	50.47	47.76	2.71	0.84

PS CATI Panel A = PS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with laptop computers (CAPI).

PS NonCATI Panel B = PS sample that cannot be sent to CATI. All sample interviewed with laptop computers (CAPI).

MIS 1 and MIS 5 not included in Panel A or Panel B.

Table A-3

EFFECT OF CENTRALIZED TELEPHONE INTERVIEWING

Civilian Labor Force Participation Rate
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	PS CATI Panel A	PS NonCATI Panel B	Difference A-B	P-value
Total	67.18	66.62	0.56	0.85
Men	75.57	75.45	0.12	0.97
Women	59.84	58.96	0.89	0.74
White	67.93	67.55	0.38	0.92
Men	76.68	76.61	0.07	0.99
Women	60.01	59.47	0.54	0.87
Black	62.28	57.64	4.64	0.74
Men	66.60	62.53	4.07	0.79
Women	59.25	53.94	5.32	0.72

PS CATI Panel A = PS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with laptop computers (CAPI).

PS NonCATI Panel B = PS sample that cannot be sent to CATI. All sample interviewed with laptop computers (CAPI).

MIS 1 and MIS 5 not included in Panel A or Panel B.

Table A-4

Bonferroni Multiple Comparisons Tests for Centralized Telephone Interviewing Effect (alpha=0.10)

Unemployment Rate Test:

	Individual P-Values
White Male	0.59
White Female	0.52
Black Male	0.07
Black Female	0.21

Employment to Population Ratio Test:

	Individual P-Values
White Male	0.95
White Female	0.93
Black Male	0.93
Black Female	0.84

(No significant results)

Table B-1

EFFECT OF CENTRALIZED TELEPHONE AND COMPUTER-ASSISTED INTERVIEWING

Unemployment Rate
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	CPS CATI Panel C	CPS NonCATI Panel D	Difference C-D	P-value
Total	7.55	6.54	1.00	0.00*
Men	7.78	6.81	0.96	0.00*
Women	7.28	6.24	1.04	0.00*
White	6.64	5.57	1.07	0.00*
Men	6.91	5.80	1.11	0.00*
Women	6.32	5.30	1.03	0.00*
Black	13.42	12.30	1.12	0.18
Men	14.10	13.90	0.20	0.76
Women	12.84	10.98	1.86	0.04*

CPS CATI Panel C = CPS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with paper and pencil (PAPI).

CPS NonCATI Panel D = CPS sample that cannot be sent to CATI. All sample interviewed with paper and pencil (PAPI).

MIS 1 and MIS 5 not included in Panel C or Panel D.

*Differences significant at the 10% level.

Table B-2

EFFECT OF CENTRALIZED TELEPHONE AND COMPUTER-ASSISTED INTERVIEWING

Employment to Population Ratio
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	CPS CATI Panel C	CPS NonCATI Panel D	Difference C-D	P-value
Total	62.78	61.94	0.84	0.45
Men	71.42	70.48	0.95	0.58
Women	55.16	54.51	0.65	0.57
White	64.09	63.32	0.77	0.58
Men	73.12	72.22	0.91	0.65
Women	55.94	55.32	0.62	0.65
Black	55.54	53.47	2.07	0.61
Men	60.22	58.30	1.92	0.70
Women	52.12	50.17	1.95	0.67

CPS CATI Panel C = CPS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with paper and pencil (PAPI).

CPS NonCATI Panel D = CPS sample that cannot be sent to CATI. All sample interviewed with paper and pencil (PAPI).

MIS 1 and MIS 5 not included in Panel C or Panel D.

Table B-3

EFFECT OF CENTRALIZED TELEPHONE AND COMPUTER-ASSISTED INTERVIEWING

Civilian Labor Force Participation Rate
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	CPS CATI Panel C	CPS NonCATI Panel D	Difference C-D	P-value
Total	67.91	66.28	1.63	0.16
Men	77.45	75.63	1.82	0.31
Women	59.49	58.13	1.36	0.27
White	68.65	67.05	1.59	0.27
Men	78.55	76.66	1.89	0.37
Women	59.72	58.42	1.30	0.36
Black	64.16	60.97	3.19	0.46
Men	70.11	67.71	2.40	0.67
Women	59.80	56.36	3.44	0.48

CPS CATI Panel C = CPS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with paper and pencil (PAPI).

CPS NonCATI Panel D = CPS sample that cannot be sent to CATI. All sample interviewed with paper and pencil (PAPI).

MIS 1 and MIS 5 not included in Panel C or Panel D.

Table B-4

Bonferroni Multiple Comparisons Tests for Centralized Telephone and Computer-Assisted Interviewing Effect

alpha=0.10

Unemployment Rate Test:

	Individual P-Values
White Male	0.00
White Female	0.00
Black Male	0.76
Black Female	0.04

This test is significant at 10% joint confidence level

Employment to Population Ratio Test:

	Individual P-Values
White Male	0.65
White Female	0.65
Black Male	0.70
Black Female	0.67

This test is not significant.

Table C-1

EFFECT OF QUESTIONNAIRE

Unemployment Rate
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	PS CATI Panel E	CPS CATI Panel F	Difference E-F	P-value
Total	8.12	7.87	0.25	0.44
Men	8.07	8.06	0.01	0.97
Women	8.16	7.65	0.52	0.11
White	6.91	6.92	-0.02	0.95
Men	7.03	7.12	-0.09	0.80
Women	6.76	6.68	0.08	0.80
Black	15.03	13.65	1.38	0.07*
Men	15.16	14.46	0.70	0.31
Women	14.92	12.96	1.96	0.03*

PS CATI Panel E = PS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with laptop computers (CAPI).

CPS CATI Panel F = CPS sample that can be sent to CATI but includes nonCATI sample. NonCATI sample interviewed with paper and pencil (PAPI).

MIS 1 and MIS 5 not included in Panel E or Panel F.

*Differences significant at the 10% level.

Table C-2

EFFECT OF QUESTIONNAIRE

Employment to Population Ratio
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	PS CATI Panel E	CPS CATI Panel F	Difference E-F	P-value
Total	61.80	61.54	0.26	0.84
Men	69.59	70.40	-0.81	0.65
Women	54.95	53.80	1.15	0.35
White	63.36	62.72	0.64	0.72
Men	71.48	72.10	-0.63	0.78
Women	55.94	54.36	1.57	0.30
Black	53.16	55.01	-1.85	0.72
Men	56.83	59.59	-2.76	0.63
Women	50.57	51.68	-1.11	0.84

PS CATI Panel E = PS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with laptop computers (CAPI).

CPS CATI Panel F = CPS sample that can be sent to CATI but includes nonCATI sample. NonCATI sample interviewed with paper and pencil (PAPI).

MIS 1 and MIS 5 not included in Panel E or Panel F.

Table C-3

EFFECT OF QUESTIONNAIRE

Civilian Labor Force Participation Rate
(14 Month Average, 10/92 - 12/93 excluding 3/93)

	PS CATI Panel E	CPS CATI Panel F	Difference E-F	P-value
Total	67.26	66.79	0.47	0.73
Men	75.70	76.57	-0.87	0.64
Women	59.83	58.26	1.58	0.23
White	68.06	67.39	0.67	0.71
Men	76.88	77.63	-0.75	0.75
Women	59.99	58.26	1.73	0.28
Black	62.56	63.71	-1.15	0.84
Men	66.98	69.67	-2.68	0.68
Women	59.45	59.38	0.07	0.99

PS CATI Panel E = PS sample that can be sent to CATI, but includes nonCATI sample. NonCATI sample interviewed with laptop computers (CAPI).

CPS CATI Panel F = CPS sample that can be sent to CATI but includes nonCATI sample. NonCATI sample interviewed with paper and pencil (PAPI).

MIS 1 and MIS 5 not included in Panel E or Panel F.

Table C-4

Bonferroni Multiple Comparisons Tests for Questionnaire Effect
(alpha=0.10)

Unemployment Rate Test:

	Individual P-Values
White Male	0.80
White Female	0.80
Black Male	0.31
Black Female	0.03

Employment to Population Ratio Test:

	Individual P-Values
White Male	0.78
White Female	0.30
Black Male	0.63
Black Female	0.84

(No significant results).

Table D-1

EFFECT OF NEW QUESTIONNAIRE DESIGNED FOR COMPUTER-ASSISTED INTERVIEWING

Unemployment Rate
(12 Month Average, 1/93 - 12/93)

	PS NonCATI Panel G	CPS NonCATI Panel H	Difference G-H	P-value
Total	7.48	6.83	0.64	0.00*
Men	7.57	7.06	0.52	0.01*
Women	7.36	6.57	0.79	0.01*
White	6.43	5.94	0.49	0.01*
Men	6.59	6.20	0.39	0.04*
Women	6.23	5.62	0.61	0.00*
Black	15.06	13.43	1.63	0.03*
Men	15.52	14.02	1.50	0.08*
Women	14.67	12.84	1.83	0.04*

PS NonCATI Panel G = All MIS 1 and MIS 5 PS sample. This sample is never sent to CATI. Sample is interviewed with laptop computers (CAPI).

CPS NonCATI Panel H = All MIS 1 and MIS 5 CPS sample. This sample is never sent to CATI. Sample is interviewed with paper and pencil (PAPI).

*Differences significant at the 10% level.

Table D-2

EFFECT OF NEW QUESTIONNAIRE DESIGNED FOR COMPUTER-ASSISTED INTERVIEWING

Employment to Population Ratio
(12 Month Average, 1/93 - 12/93)

	PS NonCATI Panel G	CPS NonCATI Panel H	Difference G-H	P-value
Total	61.98	61.98	-0.01	1.00
Men	69.59	70.22	-0.63	0.14
Women	55.00	54.43	0.56	0.28
White	63.11	63.08	0.03	0.94
Men	71.06	71.68	-0.62	0.14
Women	55.74	55.06	0.69	0.19
Black	53.92	54.62	-0.70	0.56
Men	58.20	59.20	-1.00	0.36
Women	50.40	50.86	-0.46	0.66

PS NonCATI Panel G = All MIS 1 and MIS 5 PS sample. This sample is never sent to CATI. Sample is interviewed with laptop computers (CAPI).

CPS NonCATI Panel H = All MIS 1 and MIS 5 CPS sample. This sample is never sent to CATI. Sample is interviewed with paper and pencil (PAPI).

Table D-3

EFFECT OF NEW QUESTIONNAIRE DESIGNED FOR COMPUTER-ASSISTED INTERVIEWING

Civilian Labor Force Participation Rate
(12 Month Average, 1/93 - 12/93)

	PS NonCATI Panel G	CPS NonCATI Panel H	Difference G-H	P-value
Total	66.99	66.53	0.45	0.24
Men	75.29	75.55	-0.26	0.51
Women	59.37	58.26	1.11	0.03*
White	67.46	67.06	0.40	0.29
Men	76.07	76.42	-0.35	0.37
Women	59.44	58.34	1.11	0.04*
Black	63.46	63.09	0.37	0.78
Men	68.85	68.85	0.01	1.00
Women	59.02	58.35	0.65	0.55

PS NonCATI Panel G = All MIS 1 and MIS 5 PS sample. This sample is never sent to CATI. Sample is interviewed with laptop computers (CAPI).

CPS NonCATI Panel H = All MIS 1 and MIS 5 CPS sample. This sample is never sent to CATI. Sample is interviewed with paper and pencil (PAPI).

*Differences significant at the 10% level.

Table D-4

Bonferroni Multiple Comparisons Tests for Questionnaire Designed for Computer-Assisted Interviewing Effect
(alpha=.10)

Unemployment Rate Test:

	Individual P-Values
White Male	0.04
White Female	0.00
Black Male	0.08
Black Female	0.04

This test is significant at the 10% joint confidence level.

Employment to Population Ratio Test:

	Individual P-Values
White Male	0.14
White Female	0.19
Black Male	0.36
Black Female	0.66

(No significant results)