Effects of Methodological Change in the Current Population Survey

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In January 1994, a new measurement system was introduced into the Current Population Survey (CPS). The introduction of a new questionnaire and data collection procedures was the result of a research and development process that began in 1986. Two important goals of the redesign were to improve data quality and to increase the availability of information on labor market activity on a monthly basis.

By modifying question wording and sequencing to better operationalize existing definitions, reduce the reliance on volunteered information, and embed explicit and implicit recall strategies, data quality was improved. Changes in the definition of discouraged workers recommended by the National Commission on Employment and Unemployment Statistics were implemented, along with increasing the availability of the data by moving the questions from the quarter-sample being interviewed for the fourth and eighth times to the full sample. Questions on multiple job holding were also added.

The new questionnaire was developed for a fully-automated collection environment with field representatives using laptop computers for both their personal visit and telephone interviews (CAPI) and with a centralized staff of interviewers from a telephone, facility (CATI). Thus, it was possible to use complex skip patterns to tailor questions to respondents' situations and information from prior interviews to reduce respondent burden.

To measure the effects of the new measurement system, a Parallel Survey (PS) of 12,000 occupied housing units was conducted from July 1992 through December 1993. While the PS was designed to replicate the collection methodology and procedures as they would be incorporated into CPS in January 1994, it was only one-fifth the size of CPS, had a national rather than a state-based sample as in CPS, and used a simpler post-stratification estimation procedure. Since the percentage of sample units to be interviewed from the centralized telephone facilities was to double in January 1994, the PS had about twice as many sample units being assigned to CATI. Continuing the practice of CPS to embed subpanels to test for the effects of different modes of collection, the PS (and CPS) contained panels for testing the following hypotheses:

- HI: No centralized telephone interviewing effect
- H2: No centralized & CATI effect
- H3: No questionnaire effect given centralized telephone interviewing
- H4: No questionnaire designed for CAI effect.

An important factor in the measurement process which could not be controlled in an experimental design sense was the interviewing staff. While we attempted to limit interviewer effects by moving some experienced CPS interviewers to the PS and allowing for up to six months for field experience with the new questionnaire and collection methodology, there remains the possibility of the results being affected by interviewers. Interviewers' knowledge and behavior could have been affected by their prior experience.

Based on the 1993 annual average estimates from CPS and the PS, the new measurement system was expected to yield .5 percentage point higher estimates of the overall unemployment rate and .7 percentage point higher estimates of the unemployment rate for women. While no significant difference was found between estimates of the overall employment-to-population ratio from the PS and CPS, the estimate from the PS for men was .6 percentage point lower than CPS and .7 percentage point higher for women. The PS also yielded 21 percent lower estimates of the number of part-time workers for economic reasons and 9.7 percent higher estimates of the number of self-employed. Among the unemployed, there were no significant differences in the number on layoff between the two surveys, but the estimated number of new entrants from the PS was 34 percent lower than from CPS.

When the embedded panels were used to test the above hypothesis with respect to the unemployment rate (UER) overall and for various demographic subpopulations, evidence of possible effects were found for the following.

Questionnaire given centralized telephone interviewing: Total female UER (marginally), total black and black female UER

Questionnaire designed for CAI: Total, total male, & total female UER; total white, white male, & white female UER; total black, black male, & black female UER; total female & white female LFPR

Centralized interviewing: Total unemployment rate (marginally); total black & black male unemployment rate

Centralized & CATI: Total, total female, & total male UER; total white, white female, & white male UER; black female UER.

In order to determine if various sample design differences between the PS and CPS could be affecting the results, the CPS was reweighted using PS post-stratification procedures (no significant difference), and the PS was reweighted to reflect the percent centralized interviewing to be used in January 1994 (.08 percentage point lower). Also, since the CPS would begin using 1990-census-based population controls in January 1994, it was reweighted to determine the effect of switching from 1980 to 1990 controls (.10 percentage point higher). It was not possible to evaluate the effects of not using the composite estimator in January 1994 or the effects of using seasonal adjustment factors based on old CPS with the new.

Having found no evidence that the observed differences in estimates from the two surveys were due to sampling design, the decision was made to continue parallel measurement, only with the new measurement system being used in CPS and the old measurement system being used in the PS. While we would have preferred to keep at least some portion of the measurement process constant from December to January, this was not possible due to the differences in the sample designs. Namely, to provide monthly estimates for the 11 largest states and annual average estimates for the remaining states with the required reliability, the entire state-based CPS sample had to use the same collection methodology, and the PS with its national versus state-based sample could not be used.

In preparation for the conversion of CPS from old to new methodologies in January 1994, CPS interviewers began training on the new methodology in September 1993. They were given home studies, attended classroom training, and had several months of dummy assignments to practice in the field. Moreover, provisions were made for moving some PS interviewers to CPS and others to other Census-collected current surveys. Thus, when the decision was made to continue the PS, almost 65% of the required staff had to be hired and trained in less than two months. In both surveys, the respondents in the overlapping panels between December and January (75%) experienced a shift from one measurement system to another.

The monthly unemployment rate estimates from the two measurement systems a-re presented in figure 1. (The PS was discontinued after May for budgetary reasons.) While the estimated unemployment rate from CPS was higher in January than December, it does not appear as if the expected annual average increase of .6 percentage points (.5 for methodology change and .1 for change in population controls) will be observed. Moreover, while we knew there could be problems with the PS in the first few months of 1994 due to new interviewers and switching respondents from new to old methodology, the monthly estimates continued to be higher than those from CPS. On the other hand, the expected effects of changing measurement systems on other labor force characteristics appear to have occurred.

To help users of CPS time series data bridge the gap between the old and new methodologies, the parameters of a linear model with main effects for survey and collection method were estimated by GLS under three sets of restrictions, necessitated by the model not being fully identifiable. While a primary goal of this modeling effort was to develop adjustment factors for analysts (see tables 1 and 2), significance tests for main effects were also conducted. Under the restriction that the old and new collection method effects were the same both before and after the switch in January, it was possible to estimate a new method effect and a PS effect. For some labor force items, the estimated new method effect is similar to that estimated by comparing 1993 annual averages from the two surveys. In other cases, most importantly, the overall unemployment rate, this is not true.

There are a number of lessons that can be learned from this experience of parallel testing. Most importantly, parallel testing should be done if major changes a-re to be made in a measurement process. It is just as important to remember, especially when analyzing the results for an ongoing rotating panel survey like CPS, that you only have one observation for each of two treatments. Either one or both of the estimates could be from the tail of the sampling distribution. While one can estimate the sampling variance, nonsampling error is really the focus, since, presumably, the change in measurement process is to reduce nonsampling error, Therefore, it is necessary to address all of the factors which could affect both sampling and nonsampling errors. With the exception of the methodological changes being tested, the parallel survey should mimic is much as possible the entire survey design environment of the main survey. This includes interviewer training and experience, field management procedures, and sample design. If multiple changes are being tested, a sample design which allows for the testing of separate effects should be attempted in order to assess which of the changes might be affecting the nonsampling error structure.

For further details on the results of the parallel testing, see the following reports which can be obtained by contacting the Office of Survey Methods Research, Bureau of Labor Statistics, at 202-606-7370 or fax 202-606-7426.

Kostanich, Donna L. and Cahoon, Lawrence S. (I 994), *Effect of Design Differences Between the Parallel Survey and the New CPS,* CPS Bridge Team Technical Report 3, March 4.

Miller, Stephen M. (I 994), *What Would the Unemployment Rate Have Been Had the Redesigned Current Population Survey Been in Place from September 1 992 to December 1993?: A Measurement Error Analysis,* CPS Bridge Team Technical Report 1, March 3.

Polivka, Anne E. (1994), *Comparisons of Labor Force Estimates from the Parallel Survey and the CPS During 19,93: Major Labor Force Estimates,* CPS Overlap Analysis Team Technical Report 1, March 18.

Rothgeb, Jennifer M. (1994), *Revisions to the CPS Questionnaire: Effects on Data Quality,* CPS Overlap Analysis Team Technical Report 2, April 6.

Thompson, Jenny (1994), *Mode Effects Analysis of Major Labor Force Estimates, CPS* Overlap Analysis Team Technical Report 3, April 14.

Table 1. Parameter Estimates for Employment-to-Population Ratio (Restriction 3)

	Multiply	Additive '93	Average
Total	1.0053*	0.33*	61.6
Men 16+	0.9964	-0.25	69.9
Women 16+	1.0156*	0.84*	54.1
White Men	0.9967	-0.23	71.3
White Wm.	1.0169*	0.92*	54.7
Black Men	0.9831	- 1.02*	59.1
Black Wm.	1.0093	0.48	50.5
Teenagers	1.005	0.21	41.7
55-64 Years	1.0124	0.65	53.8

Table 2. Parameter Estimates for
Unemployment Rate (Restriction 3)

	Multiply	Additive	'93 Average
Total	1.009	0.079	6.8
Men 16+	1.012	0.10	7.1
Women 16+	1.007	0.07	6.5
White Men	1.029	0.19	6.2
White Wm.	1.025	0.15	5.7
Black Men	0.971	-0.38	12.4
Black Wm.	0.965	-0.48	11.0
Men 16-19	1.029	0.71	20.4
Men 25-55	0.983	-0.08	
Men 65+	1.69*	1.93*	3.2
Wm. 25-55	0.992	-0.04	