

**THE SURVEY OF INCOME AND  
PROGRAM PARTICIPATION**

**THE SURVEY OF INCOME AND  
PROGRAM PARTICIPATION IN THE  
1990'S**

**No. 167**

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Bureau of the Census**

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# THE SURVEY OF INCOME AND PROGRAM PARTICIPATION IN THE 1990S

## PART I. SURVEY DESIGN

by

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The Survey of Income and Program Participation (SIPP) began in late 1983. The survey is now mature enough for the Census Bureau to take a hard look at its design and ask whether the survey is best meeting the needs of its customers. The Bureau began this process by extensive consultation with current and potential users on issues related to SIPP. In addition to Bureau employees, these users included a Committee on National Statistics (CNSTAT) panel on SIPP, federal agency members of the Office of Management and Budget interagency advisory group as well as other interested agencies, a special subcommittee of the American Statistical Association's Survey Research and Methodology Section, the Association of Public Data Users SIPP subcommittee, known academic users and government contractors, and individuals identified by staff and others as potential users.

The following lists some of the major concerns with the current SIPP design that surfaced as a result of these consultations:

1. Small sample sizes are a problem when analyzing subgroups, particularly when analyzing the activities over several months (i.e. longitudinal analysis). It has also been difficult to combine overlapping panels to enhance cross-

section analysis.

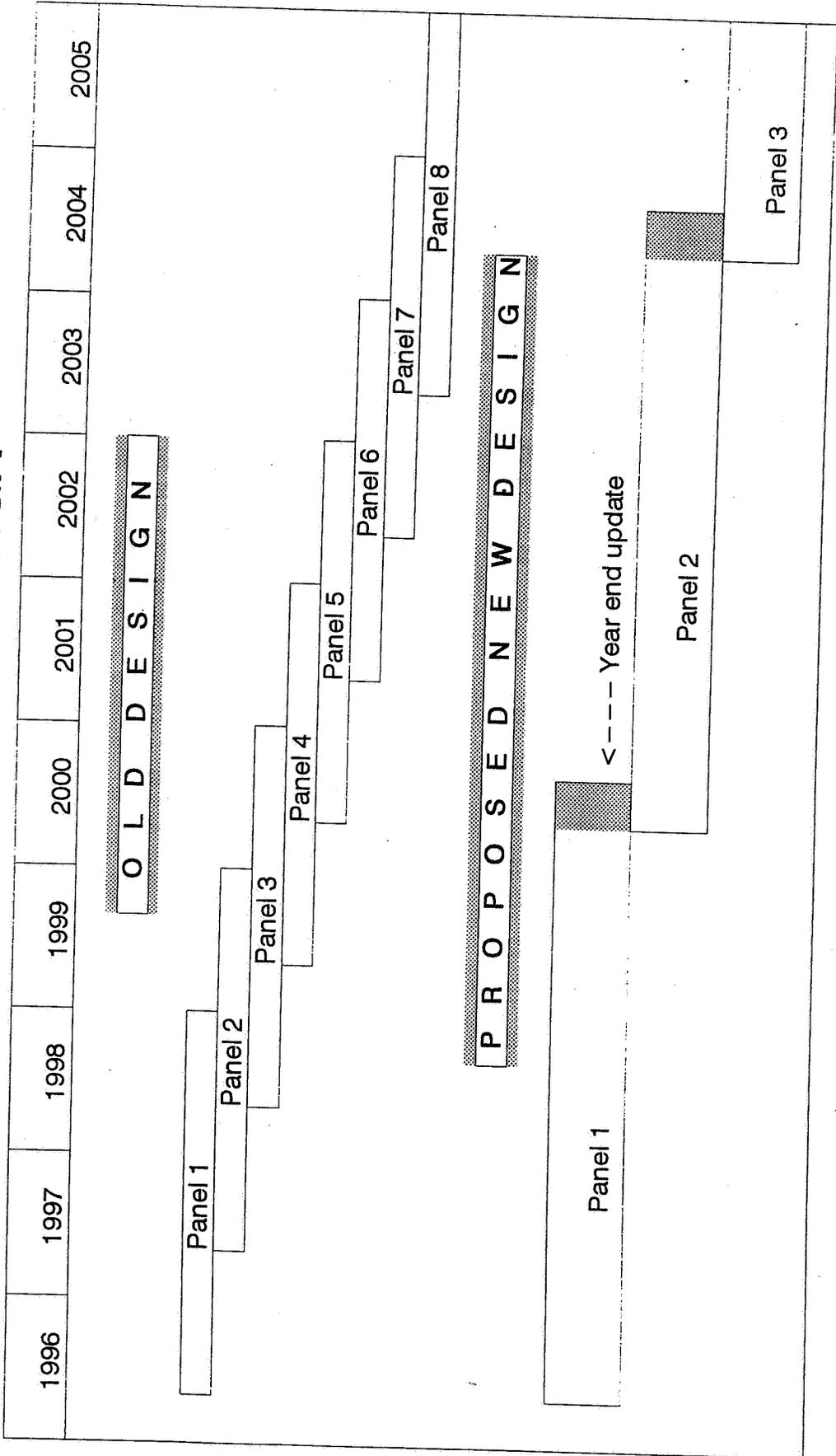
2. Panel lengths have been too short to observe a sufficient number of completed spells. Longitudinal users, however, have emphasized maintaining the short (four-month) reference period to promote accurate reporting of short spells.
3. Cross-section users were concerned with maintaining sample representativeness; they also supported a short reference period, such as the current four months.
4. Users desire an improved edit and imputation system, one that emphasizes the longitudinal character of the survey.
5. Users desire easier access to the microdata from SIPP, along with improved documentation of the files and the processing system.

The current SIPP design involves a 32-month longitudinal panel survey interviewing roughly 20,000 households every four months, with a new panel beginning every 12 months. The CNSTAT committee recommended that the Bureau adopt a design that involves a 48-month panel length, four-month recall (i.e. interviewing once every four months), with a new panel beginning every two years (two-year overlap), along with a research program to investigate the effects of a six-month recall period (Citro and Kalton, 1993).

After reviewing the advantages and disadvantages of various designs and paying particular attention to the CNSTAT panel's report on the future of SIPP, the Census Bureau has decided to adopt the following design (illustrated in Figure 1) for SIPP in

FIGURE 1

# SIPP PANEL DESIGN



Total Cases:

Old design: 20,000 interviewed households per panel; 2 or 3 panels in the field concurrently

New design: 50,000 interviewed households per panel; one panel in the field at a time

the 1990s:

- o a 48-51 month panel with data collected for four full calendar years (the methodology to do so is currently under development);
- o four-month recall;
- o a new panel beginning every four years (no overlap).

This design allows us to field a SIPP of 50,000 households over a long enough time to observe a much larger number of complete spells. Several specific issues are important in this design decision.

#### A. Panel Length

Lengthening the panel to four years responds to the clearly expressed need by nearly all our users for additional data on the short-term causes and consequences of life events, such as welfare participation, household dissolution, etc. The Bureau has also decided that calendar year core data shall be collected for the entire fourth calendar year of the panel; a staff committee has been established to explore options for doing so. We do not believe it is wise to extend the panel length beyond four years at this time. The value of such an extension to the users (particularly for measuring more complete spells) has not been demonstrated to outweigh the potential costs of additional sample attrition.

Further, we believe that a follow-up annual longitudinal survey with a subsample of completed SIPP cases may have merit;

therefore we have established a group with the task of soliciting further user input and expressions of funding interest from other agencies as well as laying out in one coherent document the advantages and disadvantages of such a survey.

#### B. Recall Period

We concur with recommendations to maintain a four-month recall period and investigate a six-month recall period. We also agree that the evidence is as yet insufficient to move SIPP to a six-month recall period. Consequently, we have established a research project to learn as much as possible from existing studies and data sets. This research will establish whether the potential gains of extending the recall period warrant full field testing.

#### C. Overlap

The two key issues in deciding on the panel overlap are time-in-sample bias and attrition bias. Current evidence from our research suggests that time-in-sample bias for a 32-month panel is minimal and that non-overlapping (abutting) panels will not worsen the effect of attrition bias on cross-section estimates when compared to the current overlapping design (for further details, see the second part of this working paper). Consequently, we have determined that the best design involves a new panel begun every four years.

This non-overlapping panel design has operational and

analytic benefits--samples are large, field workloads are more even as a new panel is not begun until after the previous one is complete, and we need to design and maintain only one processing system. We think that potential detrimental effects of this design on cross-section estimates are small and will be further mitigated by substantial additional investment in research aimed at reducing attrition and attrition bias for the SIPP. This investment will include research on improving field procedures to retain more cases, on longitudinal editing, and on weighing the sample to correct as much as possible for known attrition.

There is attrition in the SIPP, but the vast majority occurs in the first two waves, and its bias effects are not clear. Because of the importance of improved longitudinal data, users for the most part seem willing to accept the potential additional bias to cross-section estimates from going from a one-year overlap (current design) to a two-year overlap. The CNSTAT panel has stated this explicitly: "We believe that improved weighing adjustments can compensate for attrition and time-in-sample effects, so that the benefits of less frequent introduction of new panels will more than outweigh the costs" (Citro and Kalton, 1993, p. 112).

#### D. Other Considerations

##### D.1. Content

A great many discussions with users and field representatives resulted in numerous suggestions for improvement to

the core and topical modules. Many of these will be incorporated into the new design. For example, serious consideration will be given to the CNSTAT suggestion that more frequent eligibility information be collected (Citro and Kalton, 1993, p. 75).

#### D.2 Computer-Assisted Interviewing

Consistent with other automation activities at the Census Bureau, the new SIPP will be carried out using Computer-Assisted Personal Interviewing (CAPI). Substantial time and resources must be devoted to designing this system to take full advantage of the computer environment for data improvement. Among the improvements we plan to make is increased use of dependent interviewing, where previous responses are used to frame current questions.

#### D.3 Longitudinal Processing System

To complement the shift of SIPP emphasis to a more longitudinal perspective, an entirely new longitudinally-oriented processing and editing system will be developed and new data products will be designed that take advantage of that system.

#### D.4. Oversampling

At the request of users, the redesigned SIPP panels will oversample low-income households (income 150 percent of poverty or less) based on 1990 Decennial Census information; screening interviews were judged too costly.

### E. Transition Issues

A survey redesign of this scope requires time and resources

to implement. We expect to spend much of 1993 and 1994 automating the survey, evaluating cognitive interviewing techniques, rewriting the processing system, developing improved weighing and imputation procedures, and improving data products and user access. In 1995 we will begin a dress rehearsal of the newly designed survey. We will begin the 1996 panel with the new design using all the newly developed procedures for data collection, processing, and reporting.

To fund the work necessary to make the transition to the new design, maximize the sample size, and minimize field overlap between CAPI and "paper and pencil" interviewing, we are canceling the 1994 and 1995 panels. To supply users with longer panels as soon as possible and avoid a survey hiatus, we are extending the 1992 and 1993 panels to cover a full three calendar years each. These actions make it possible to complete the work needed to implement the new survey procedures, to conduct a dress rehearsal to ensure a successful conversion, and to begin the 1996 panel with a sample size of 50,000 households. (See Figure 2 for a summary of transition panels.)

Time and budget constraints necessitate tradeoffs. We conclude that the approach we are following yields the greatest payoff to users in the shortest possible time frame.

For further information, please contact Enrique Lamas, Special Assistant for SIPP, Housing and Household Economic Statistics Division, U.S. Bureau of the Census, Washington DC 20233-3300; (301) 763-8018.

FIGURE 2

# SIPP Redesign Transition Activities

Culmination of the Current Design  
(Fiscal years 1994 – 1996)

PANEL	FY 1994	FY 1995	FY 1996
1992	Wave 6	Wave 7	Wave 8
	Wave 8	Wave 9	Wave 10
1993	Wave 3	Wave 4	Wave 5
	Wave 6	Wave 7	Wave 8
	Wave 9	Wave 10	
Dress Rehearsal	Wave 1	Wave 2	Wave 3
1996	Wave 1	Wave 2	Wave 2

## PART II. ABUTTING PANELS IN THE SIPP

by

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One of the design features of the current SIPP is overlapping panels. Initially, we instituted the overlapping panel design because of concerns about time-in-sample and attrition effects. However, extensive research has led us to re-examine these concerns. In the following sections, we examine the statistical issues related to overlapping panels by considering three alternate SIPP designs -- the current design (32-month panels with 20-month overlap), four-year panels with two-year overlap, and four-year abutting panels.

### A. Time-in-Sample Effect

The time-in-sample effect refers to potential bias arising from respondents remaining in a survey's sample for more than one interview. It includes the conditioning effect on respondents' answers from the repeated exposure to the SIPP questionnaire and nonresponse's effect on SIPP data quality. This effect in the SIPP has been examined by Chakrabarty (1988), McCormick et al. (1992) and Pennell and Lepkowski (1992). Results of these examinations suggest little, if any, time-in-sample bias.

Using 1984 panel data, Chakrabarty found the effects of

time-in-sample to be significant for some labor force activity items, but not for monthly estimates of income and benefits reciprocity items for persons and households. Using 1984 through 1987 panel data, McCormick found some significant differences in state unemployment compensation, AFDC, Food Stamps, and SSI. However, there were no clear directions or patterns in the differences, suggesting that differences cannot be attributed to the time-in-sample effect and may be due to noise in the data. Also, first quarter estimates that include wave 1 data were significantly different from those based on later waves' data. Again there was no pattern within a variable across different panels. Using 1985 through 1987 panel data, Pennell and Lepkowski concluded that there is no evidence to indicate that attrition nonresponse and panel conditioning are problems in the current SIPP.

#### B. Attrition

Because sample loss (due to refusals or failure to locate movers) increases with the number of interviews, attrition is an important concern in longitudinal surveys such as the SIPP. The following sections provide information on attrition rate for the current SIPP design and project these rates for four-year panels with two-year overlap and four-year abutting panels and compare wave-by-wave and annualized attrition rates for the three designs.

### B.1 Attrition in the SIPP

Table 1 shows actual household sample loss rates for the 1984 through 1990 panels. Based on this historical pattern of nonresponse rates for the SIPP panels, we expect the sample loss for each additional wave to be less than 1 percent. Averaging the household attrition rates and adding 1 percent sample loss per wave to project the sample loss when more waves are included, we estimate the household attrition rate at the end of 12 waves will be 25 percent, compared to 21 percent at the end of 8 waves. The CNSTAT panel on the SIPP also estimated the household attrition rate at the end of 12 waves to be approximately 25 percent (Citro and Kalton, 1993, p. 102).

Tables 2 and 3 present sample loss rates for the current design in which the overlap begins with the fourth wave and under a four-year panel design in which the overlap begins with the seventh wave. It is important to note that most of the household sample loss in a panel occurs in the first year before the overlapping panel is introduced. For the current design, the nonresponse rate for the panel is 16.3 percent before panel 2 is introduced. For the four-year panel/two-year overlap the nonresponse rate is 20.2 percent before panel 2 is introduced.

### B.2 Comparison of Wave-By-Wave and Annualized Attrition Rates

Table 4 presents wave-by-wave combined panel attrition rates for the current overlapping design and a four-year panel/two-year overlap design, and wave-by-wave attrition rates for a four-year

abutting panel design. The table shows that for the first eight waves, wave-by-wave attrition rates for:

- o a four-year abutting panel design range from 4.8 percent lower to 8.7 percent higher than the current overlapping design;
- o a four-year overlapping design are always higher than the current overlapping design and range from 1.3 percent to 8.1 percent higher;
- o an abutting panel design range from 6.7 percent lower to 6.8 percent higher than the four-year overlapping panel -- half of the waves have lower and the other half have higher rates.

Table 4 also shows differences in the combined panel attrition rates for the current design and the attrition rates for a four-year abutting panel design. In addition, differences in combined panel attrition rates between the current design and a four-year overlapping design are shown. In all except two of the eight waves, the first set of differences is better.

Table 5 presents annualized attrition rates. Based on the first eight waves, annualized attrition rates for:

- o an abutting panel design are either 3.2 percent lower or 3.2 percent higher than the current overlapping design;
- o a four-year overlap design are always higher than the current overlapping design and range from 1.5 percent to 4.9 percent higher;
- o an abutting panel range from 4.7 percent lower to 4.6

percent higher than the four-year overlapping design -- half of the years have lower and the other half have higher rates.

Differences in the annualized combined panel attrition rates for the current overlapping design and the attrition rates for a four-year abutting design and differences in combined panel attrition rates between the current overlapping design and a four-year overlapping design are shown in Table 5. The first set of differences is better than the second set.

Together, Tables 4 and 5 show that for earlier waves and years of a panel, an abutting panel design has less attrition than an overlapping design. For later waves and years the abutting panel design has more attrition, but no more than about 4.5 percentage points higher.

In practice, overlapping panels have rarely been combined because it requires additional work and because data users take the first available data file. If panels are not combined, the wave-by-wave and annualized attrition rates for the overlapping design are identical to the abutting design rates. When overlapping panels are combined, overall there is little, if any, gain in household response rates. Therefore, we have concluded that the gains in response rates are small in comparison to the cost of sacrificing other gains available from abutting panels, especially since combining panels is rarely done in practice.

### B.3 Attrition Observations

In summary, we observe that:

- o The overall attrition of longer panels will be only slightly higher than the final attrition rate for the current panels (25 versus 21 percent).
- o Since most of the attrition occurs in the first year of a panel, overlapping panels after the second year would do little to reduce attrition.
- o If panels are not combined (and they rarely are) the attrition rates for the overlapping design are identical to those for an abutting design.

### C. Attrition Research

Much research on attrition in the SIPP has been conducted. The first section below gives results from this research. The current research program is described in the second section. Integration of these research results will result in a weighing and imputation system that will reduce attrition bias for the key SIPP estimates.

#### C.1 Research Results

Research results show that the SIPP attrition rates differ by characteristics and that the current weighing and imputation procedures could be modified to reduce attrition biases. A study by McArthur (1987), based on all 9 waves of the 1984 panel, compares characteristics of persons for whom all interviews were completed with the characteristics of persons for whom there were

one or more noninterviews. Selected results are shown in Table 6. Persons with the following attributes had higher rates of nonresponse:

- o residence in metropolitan areas of 500,000 or more persons;
- o residence in rented living quarters;
- o non-White race;
- o children and other relatives of the reference persons;
- o age 15 to 24;
- o mover;
- o never-married;
- o no savings accounts or other assets (Jabine, et al., 1990).

Research by McCormick (1992) using the 1984 panel shows that never-married persons, persons aged 15-34, and renters tend to move more often than other persons. Additionally the results suggest that we might reduce mover nonresponse bias for estimates associated with tenure, marital status, and hours worked per week by introducing an adjustment for mover nonresponse.

An investigation by Sanchez (1991) shows that the current SIPP cross-sectional nonresponse adjustment categories, while not fully accounting for attrition of low monthly income households, do reduce nonresponse bias for estimates of monthly mean and median income. They essentially have no effect on program participation estimates. The research also suggests the inclusion of monthly income categories into the nonresponse adjustment procedure may help reduce bias.

Singh et al. (1990) used 1984 panel data to explore imputing

data for cases with one missing interview for panel, calendar year 1, and calendar year 2 estimates. They estimated that this approach reduces standard errors about 3.0, 2.4, and 1.8 percent, and reduces the number of noninterviews by about 17.5, 21, and 12 percent for the three estimates, respectively. They also noted that for most type of estimates this approach reduces nonresponse bias and provides many more waves of data from cases originally classified as noninterviews. The method does introduce a bias in transition and spell estimates. However, it is small -- the estimated maximum percent of transitions missed in a panel is 2.3% -- and occurs at the wave level.

#### C.2 Current Research

Results from several research projects designed to investigate ways to reduce attrition bias will be available by the end of 1993, in time to implement changes before the redesigned SIPP panel is introduced.

As a result of the McCormick study (1992), a project is investigating the ability of a mover nonresponse adjustment to reduce attrition bias in important SIPP estimates (Petroni, 1992). Since Singh et al.'s (1990) findings were promising, the University of Michigan (UM) is pursuing further research on the imputation issue. The UM research is exploring the imputation of multiple waves of missing data, as well as imputation for missing items. The work should permit SIPP to use more available data and, hence, reduce the bias.

Additionally, two research projects using results from

McCormick (1992), Sanchez (1991), and McArthur (1987) are exploring alternative model-based weight adjustments. The alternative approaches allow more known information to be used to adjust weights than the current weighing procedures. We believe that the incorporation of these extensive research results will further reduce bias due to attrition.

#### D. Abutting Panels in the SIPP

Existing research thus supports adoption of an abutting panel design for the SIPP for the following reasons:

- o The overlapping panel design was initially instituted in the SIPP because of concerns about time-in-sample bias. Extensive research both within and outside the Census Bureau has found no evidence of significant data problems caused by time-in-sample bias.
- o The overall attrition rate will increase only marginally from the current design.
- o Approximately two-thirds of the attrition occurs in the first year. Hence, overlapping panels at the second year does little to reduce attrition.
- o Through weighing and imputation improvements, the Bureau expects to, at minimum, eliminate the effects of any increase in attrition.
- o The panels will be much larger (50,000 households), allowing for analyses of subgroups not possible with the smaller panels.
- o Overlapping panels reduce the flexibility of extending the

length of panels. Unless panels are combined they severely restrict the size of samples that the SIPP can produce. In practice, combining of panels has been difficult and expensive and has rarely been done.

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Table 1. Household Sample Loss Rates in SIPP by Panel and Wave

Wave/Panel	1990 <sup>1</sup>	1988	1987	1986	1985	1984
1	7.1	7.5	6.7	7.3	6.7	4.9
2	12.6	13.1	12.6	13.4	10.8	9.4
3	14.4	14.7	14.2	15.2	13.2	12.3
4	16.5	16.5	15.9	17.1	16.3	15.4
5	18.8	17.8	18.1	19.3	18.8	17.4
6	20.1	18.3	18.9	20.0	19.7	19.4
7	21.0	19.3*	19.0	20.7	20.5	21.0
8	22.0*	20.3*	20.0*	21.7*	20.8	22.0
9	23.0*	21.3*	21.0*	22.7*	21.8*	22.3
10	24.0*	22.3*	22.0*	23.7*	22.8*	23.3*
11	25.0*	23.3*	23.0*	24.7*	23.8*	23.4*
12	26.0*	24.3*	24.0*	25.7*	24.8*	24.4*

\* These sample loss rates are projected assuming a 1% increase in sample loss at each wave.

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<sup>1</sup> Sample loss rates are calculated without the 1989 panel cases which were included as part of the 1990 panel.

Table 4. Wave-by-Wave Attrition Rate Comparison by Design

Design	Wave												
	1	2	3	4	5	6	7	8	9	10	11	12	
Current Panel													
Nonoverlap (A)	6.7	12.0	14.0	16.3	18.4	19.4	20.2	21.1					
Overlap (B)	11.5	15.2	16.7	11.5	15.2	16.7	11.5	15.2					
4-Year Panel													
2-Year Overlap (C)	13.4	16.6	18.0	19.6	21.2	22.2	13.4	16.6	18.0	19.6	21.2	22.2	
Abutting (D)	6.7	12.0	14.0	16.3	18.4	19.4	20.2	21.1	22.0	23.0	24.0	25.0	
Differences Between:													
C&B Designs (C-B*)	1.9	1.4	1.3	8.1	6.0	5.5	1.9	1.4					
D&B Designs (D-B*)	-4.8	-3.2	-2.7	4.8	3.2	2.7	8.7	5.9					
D&C Designs (D-C)	-6.7	-4.6	-4.0	-3.3	-2.8	-2.8	6.8	4.5	4.0	3.4	2.8	2.8	

\* Comparisons weren't done beyond 8 waves since the current design has only 8 waves.

Table 5. Annualized Attrition Rate\* Comparison by Design

Design	Year			
	1	2	3	4
Current Panel				
Nonoverlap (A)	12.1	18.5		
Overlap (B)	15.3	15.3		
4-Year Panel				
2-Year Overlap (C)	16.8	20.2	16.8	20.2
Abutting (D)	12.1	18.5	21.4	24.4
Differences Between:				
C&B Designs (C-B**)	1.5	4.9		
D&B Designs (D-B**)	-3.2	3.2		
D&C Designs (D-C)	-4.7	-1.7	4.6	4.2

\* Rates reflect a completely phased-in design.

\*\* Comparisons were not done beyond 8 waves since the current design has only 8 waves.

Table 6. Selected Characteristics of Persons by Their Interview Experience for the Full 1984 Panel

CHARACTERISTICS OF PERSONS IN WAVE 1	INTERVIEW EXPERIENCE (% distribution)			
	COMPLETED ALL	MISSED at Least Last 2	OTHER*	
			MISSED 1	MISSED 2+
<b>Relationship</b>				
Ref. persons	37.3	33.1	33.9	30.7
Primary Ind.	12.7	14.7	13.4	12.0
Spouse	31.3	23.9	25.4	23.9
Child	13.9	17.9	18.4	24.1
All Other	4.8	10.3	9.0	9.4
<b>Age</b>				
15-24	18.2	24.2	25.3	29.5
25-34	22.1	21.4	22.6	22.9
35-44	17.3	14.4	17.0	14.9
45-64	27.0	23.2	21.5	23.2
65+	15.4	16.8	13.6	9.5
<b>Race</b>				
White	88.5	83.8	82.9	78.2
Black	9.2	12.9	13.9	17.6
Other	2.3	3.3	3.2	4.2
<b>Living Quarters</b>				
Owned	72.7	62.9	65.6	59.8
Rented	24.8	35.1	32.1	37.3
Rent Free	2.4	2.0	2.3	2.8
<b>Marital Status</b>				
Never Married	20.8	28.8	28.3	33.6
Married	63.5	52.2	53.3	50.4
Other	15.8	18.9	18.5	15.9
<b>Savings Account</b>				
Yes	59.9	51.1	51.9	51.0
No	40.1	48.9	48.1	49.0

\*Interview experience categories are mutually exclusive. At least one of the last two interviews was completed for persons in the "other" category.

Source: Adapted from McArthur, 1987.

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by

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**U.S. Department of Commerce BUREAU OF THE CENSUS**

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# THE SURVEY OF INCOME AND PROGRAM PARTICIPATION IN THE 1990S

## PART I. SURVEY DESIGN

by  
Daniel H. Weinberg  
Housing and Household Economic Statistics Division

The Survey of Income and Program Participation (SIPP) began in late 1983. The survey is now mature enough for the Census Bureau to take a hard look at its design and ask whether the survey is best meeting the needs of its customers. The Bureau began this process by extensive consultation with current and potential users on issues related to SIPP. In addition to Bureau employees, these users included a Committee on National Statistics (CNSTAT) panel on SIPP, federal agency members of the Office of Management and Budget interagency advisory group as well as other interested agencies, a special subcommittee of the American Statistical Association's Survey Research and Methodology Section, the Association of Public Data Users SIPP subcommittee, known academic users and government contractors, and individuals identified by staff and others as potential users.

The following lists some of the major concerns with the current SIPP design that surfaced as a result of these consultations:

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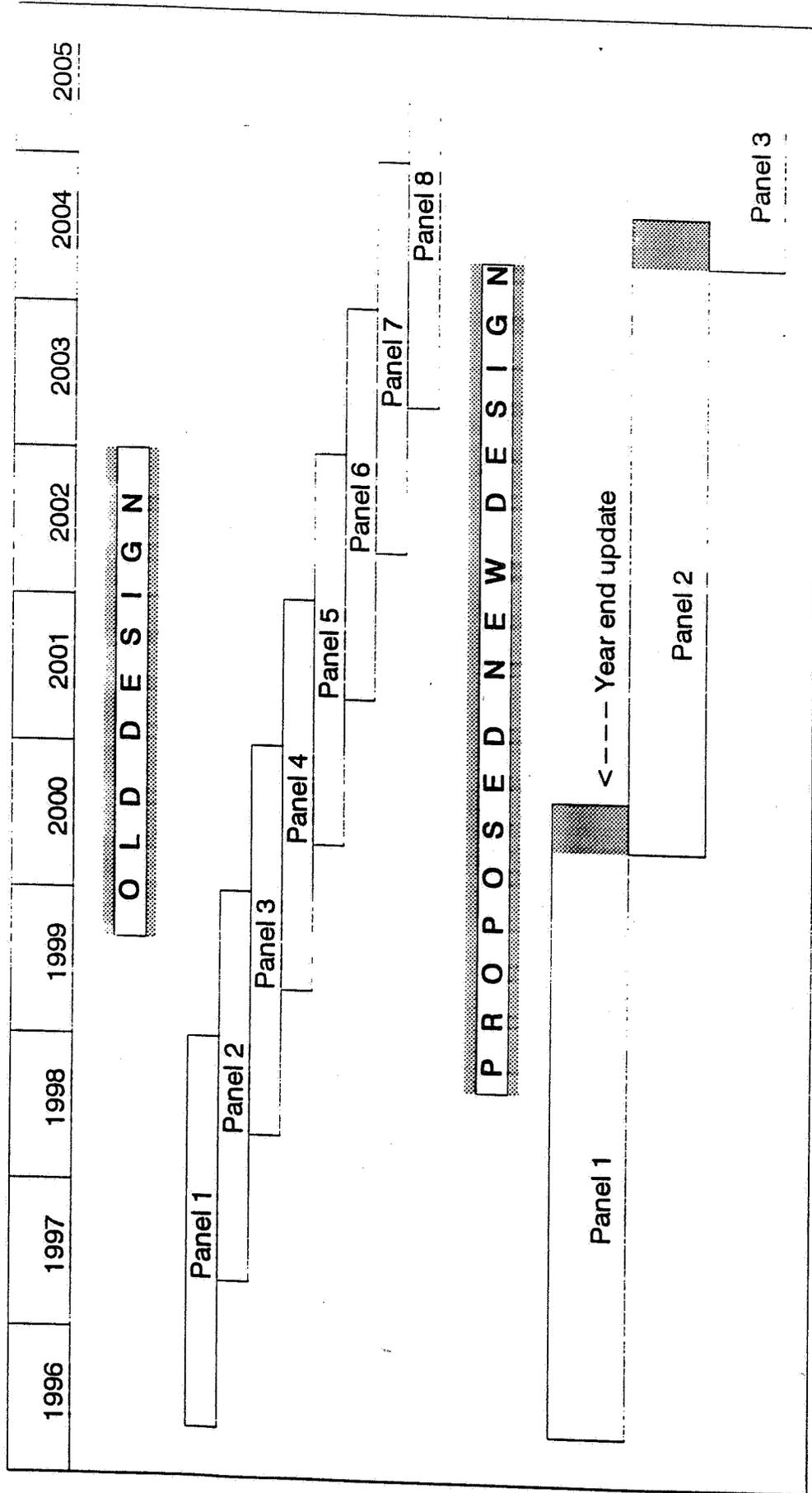
2. Panel lengths have been too short to observe a sufficient number of completed spells. Longitudinal users, however, have emphasized maintaining the short (four-month) reference period to promote accurate reporting of short spells.
3. Cross-section users were concerned with maintaining sample representativeness; they also supported a short reference period, such as the current four months.
4. Users desire an improved edit and imputation system, one that emphasizes the longitudinal character of the survey.
5. Users desire easier access to the microdata from SIPP, along with improved documentation of the files and the processing system.

The current SIPP design involves a 32-month longitudinal panel survey interviewing roughly 20,000 households every four months, with a new panel beginning every 12 months. The CNSTAT committee recommended that the Bureau adopt a design that involves a 48-month panel length, four-month recall (i.e. interviewing once every four months), with a new panel beginning every two years (two-year overlap), along with a research program to investigate the effects of a six-month recall period (Citro and Kalton, 1993).

After reviewing the advantages and disadvantages of various designs and paying particular attention to the CNSTAT panel's report on the future of SIPP, the Census Bureau has decided to adopt the following design (illustrated in Figure 1) for SIPP in

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**Total Cases:**

Old design: 20,000 interviewed households per panel; 2 or 3 panels in the field concurrently

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- o a 48-51 month panel with data collected for four full calendar years (the methodology to do so is currently under development);
- o four-month recall;
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This design allows us to field a SIPP of 50,000 households over a long enough time to observe a much larger number of complete spells. Several specific issues are important in this design decision.

#### A. Panel Length

Lengthening the panel to four years responds to the clearly expressed need by nearly all our users for additional data on the short-term causes and consequences of life events, such as welfare participation, household dissolution, etc. The Bureau has also decided that calendar year core data shall be collected for the entire fourth calendar year of the panel; a staff committee has been established to explore options for doing so. We do not believe it is wise to extend the panel length beyond four years at this time. The value of such an extension to the users (particularly for measuring more complete spells) has not been demonstrated to outweigh the potential costs of additional sample attrition.

Further, we believe that a follow-up annual longitudinal survey with a subsample of completed SIPP cases may have merit;

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We concur with recommendations to maintain a four-month recall period and investigate a six-month recall period. We also agree that the evidence is as yet insufficient to move SIPP to a six-month recall period. Consequently, we have established a research project to learn as much as possible from existing studies and data sets. This research will establish whether the potential gains of extending the recall period warrant full field testing.

### C. Overlap

The two key issues in deciding on the panel overlap are time-in-sample bias and attrition bias. Current evidence from our research suggests that time-in-sample bias for a 32-month panel is minimal and that non-overlapping (abutting) panels will not worsen the effect of attrition bias on cross-section estimates when compared to the current overlapping design (for further details, see the second part of this working paper). Consequently, we have determined that the best design involves a new panel begun every four years.

This non-overlapping panel design has operational and

analytic benefits--samples are large, field workloads are more even as a new panel is not begun until after the previous one is complete, and we need to design and maintain only one processing system. We think that potential detrimental effects of this design on cross-section estimates are small and will be further mitigated by substantial additional investment in research aimed at reducing attrition and attrition bias for the SIPP. This investment will include research on improving field procedures to retain more cases, on longitudinal editing, and on weighing the sample to correct as much as possible for known attrition.

There is attrition in the SIPP, but the vast majority occurs in the first two waves, and its bias effects are not clear. Because of the importance of improved longitudinal data, users for the most part seem willing to accept the potential additional bias to cross-section estimates from going from a one-year overlap (current design) to a two-year overlap. The CNSTAT panel has stated this explicitly: "We believe that improved weighing adjustments can compensate for attrition and time-in-sample effects, so that the benefits of less frequent introduction of new panels will more than outweigh the costs" (Citro and Kalton, 1993, p. 112).

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A great many discussions with users and field representatives resulted in numerous suggestions for improvement to

the core and topical modules. Many of these will be incorporated into the new design. For example, serious consideration will be given to the CNSTAT suggestion that more frequent eligibility information be collected (Citro and Kalton, 1993, p. 75).

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Consistent with other automation activities at the Census Bureau, the new SIPP will be carried out using Computer-Assisted Personal Interviewing (CAPI). Substantial time and resources must be devoted to designing this system to take full advantage of the computer environment for data improvement. Among the improvements we plan to make is increased use of dependent interviewing, where previous responses are used to frame current questions.

#### D.3 Longitudinal Processing System

To complement the shift of SIPP emphasis to a more longitudinal perspective, an entirely new longitudinally-oriented processing and editing system will be developed and new data products will be designed that take advantage of that system.

#### D.4. Oversampling

At the request of users, the redesigned SIPP panels will oversample low-income households (income 150 percent of poverty or less) based on 1990 Decennial Census information; screening interviews were judged too costly.

#### E. Transition Issues

A survey redesign of this scope requires time and resources

to implement. We expect to spend much of 1993 and 1994 automating the survey, evaluating cognitive interviewing techniques, rewriting the processing system, developing improved weighing and imputation procedures, and improving data products and user access. In 1995 we will begin a dress rehearsal of the newly designed survey. We will begin the 1996 panel with the new design using all the newly developed procedures for data collection, processing, and reporting.

To fund the work necessary to make the transition to the new design, maximize the sample size, and minimize field overlap between CAPI and "paper and pencil" interviewing, we are canceling the 1994 and 1995 panels. To supply users with longer panels as soon as possible and avoid a survey hiatus, we are extending the 1992 and 1993 panels to cover a full three calendar years each. These actions make it possible to complete the work needed to implement the new survey procedures, to conduct a dress rehearsal to ensure a successful conversion, and to begin the 1996 panel with a sample size of 50,000 households. (See Figure 2 for a summary of transition panels.)

Time and budget constraints necessitate tradeoffs. We conclude that the approach we are following yields the greatest payoff to users in the shortest possible time frame.

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**FIGURE 2**  
**SIPP Redesign Transition Activities**  
 Culmination of the Current Design  
 (Fiscal years 1994 – 1996)

PANEL	FY 1994	FY 1995	FY 1996
1992	Wave 6	Wave 7	Wave 8
1993	Wave 3	Wave 4	Wave 5
Dress Rehearsal	Wave 9	Wave 10	
	Wave 1	Wave 2	Wave 3
1996		Wave 1	Wave 2

## PART II. ABUTTING PANELS IN THE SIPP

by

Rita J. Petroni  
Demographic Statistical Methods Division

One of the design features of the current SIPP is overlapping panels. Initially, we instituted the overlapping panel design because of concerns about time-in-sample and attrition effects. However, extensive research has led us to re-examine these concerns. In the following sections, we examine the statistical issues related to overlapping panels by considering three alternate SIPP designs -- the current design (32-month panels with 20-month overlap), four-year panels with two-year overlap, and four-year abutting panels.

### A. Time-in-Sample Effect

The time-in-sample effect refers to potential bias arising from respondents remaining in a survey's sample for more than one interview. It includes the conditioning effect on respondents' answers from the repeated exposure to the SIPP questionnaire and nonresponse's effect on SIPP data quality. This effect in the SIPP has been examined by Chakrabarty (1988), McCormick et al. (1992) and Pennell and Lepkowski (1992). Results of these examinations suggest little, if any, time-in-sample bias.

Using 1984 panel data, Chakrabarty found the effects of

time-in-sample to be significant for some labor force activity items, but not for monthly estimates of income and benefits reciprocity items for persons and households. Using 1984 through 1987 panel data, McCormick found some significant differences in state unemployment compensation, AFDC, Food Stamps, and SSI. However, there were no clear directions or patterns in the differences, suggesting that differences cannot be attributed to the time-in-sample effect and may be due to noise in the data. Also, first quarter estimates that include wave 1 data were significantly different from those based on later waves' data. Again there was no pattern within a variable across different panels. Using 1985 through 1987 panel data, Pennell and Lepkowski concluded that there is no evidence to indicate that attrition nonresponse and panel conditioning are problems in the current SIPP.

#### B. Attrition

Because sample loss (due to refusals or failure to locate movers) increases with the number of interviews, attrition is an important concern in longitudinal surveys such as the SIPP. The following sections provide information on attrition rate for the current SIPP design and project these rates for four-year panels with two-year overlap and four-year abutting panels and compare wave-by-wave and annualized attrition rates for the three designs.

### B.1 Attrition in the SIPP

Table 1 shows actual household sample loss rates for the 1984 through 1990 panels. Based on this historical pattern of nonresponse rates for the SIPP panels, we expect the sample loss for each additional wave to be less than 1 percent. Averaging the household attrition rates and adding 1 percent sample loss per wave to project the sample loss when more waves are included, we estimate the household attrition rate at the end of 12 waves will be 25 percent, compared to 21 percent at the end of 8 waves. The CNSTAT panel on the SIPP also estimated the household attrition rate at the end of 12 waves to be approximately 25 percent (Citro and Kalton, 1993, p. 102).

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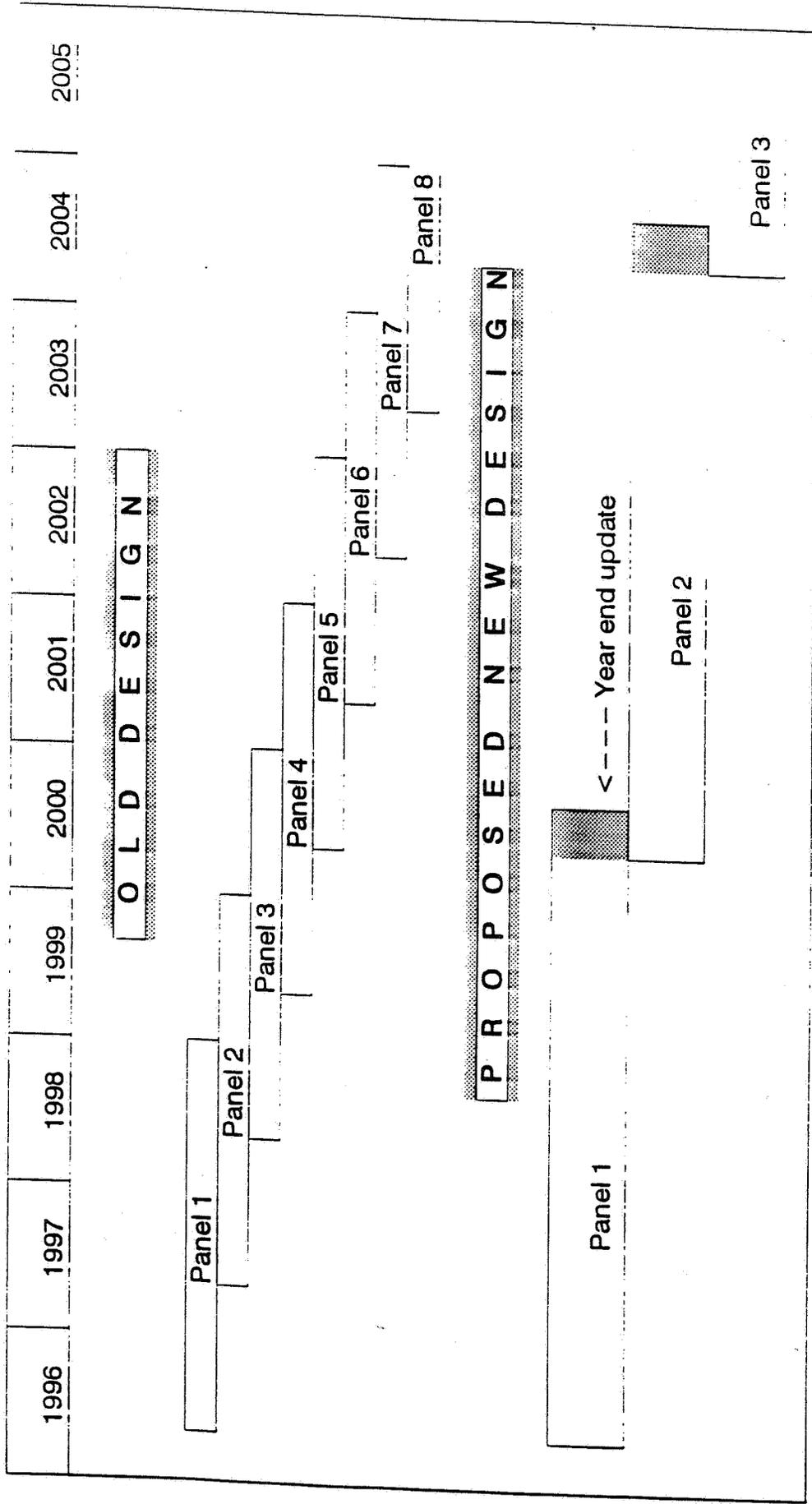
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Tables 2 and 3 present sample loss rates for the current design in which the overlap begins with the fourth wave and under a four-year panel design in which the overlap begins with the seventh wave. It is important to note that most of the household sample loss in a panel occurs in the first year before the overlapping panel is introduced. For the current design, the nonresponse rate for the panel is 16.3 percent before panel 2 is introduced. For the four-year panel/two-year overlap the nonresponse rate is 20.2 percent before panel 2 is introduced.

### B.2 Comparison of Wave-By-Wave and Annualized Attrition Rates

Table 4 presents wave-by-wave combined panel attrition rates for the current overlapping design and a four-year panel/two-year overlap design, and wave-by-wave attrition rates for a four-year

abutting panel design. The table shows that for the first eight waves, wave-by-wave attrition rates for:

- o a four-year abutting panel design range from 4.8 percent lower to 8.7 percent higher than the current overlapping design;
- o a four-year overlapping design are always higher than the current overlapping design and range from 1.3 percent to 8.1 percent higher;
- o an abutting panel design range from 6.7 percent lower to 6.8 percent higher than the four-year overlapping panel -- half of the waves have lower and the other half have higher rates.

Table 4 also shows differences in the combined panel attrition rates for the current design and the attrition rates for a four-year abutting panel design. In addition, differences in combined panel attrition rates between the current design and a four-year overlapping design are shown. In all except two of the eight waves, the first set of differences is better.

Table 5 presents annualized attrition rates. Based on the first eight waves, annualized attrition rates for:

- o an abutting panel design are either 3.2 percent lower or 3.2 percent higher than the current overlapping design;
- o a four-year overlap design are always higher than the current overlapping design and range from 1.5 percent to 4.9 percent higher;
- o an abutting panel range from 4.7 percent lower to 4.6

percent higher than the four-year overlapping design -- half of the years have lower and the other half have higher rates.

Differences in the annualized combined panel attrition rates for the current overlapping design and the attrition rates for a four-year abutting design and differences in combined panel attrition rates between the current overlapping design and a four-year overlapping design are shown in Table 5. The first set of differences is better than the second set.

Together, Tables 4 and 5 show that for earlier waves and years of a panel, an abutting panel design has less attrition than an overlapping design. For later waves and years the abutting panel design has more attrition, but no more than about 4.5 percentage points higher.

In practice, overlapping panels have rarely been combined because it requires additional work and because data users take the first available data file. If panels are not combined, the wave-by-wave and annualized attrition rates for the overlapping design are identical to the abutting design rates. When overlapping panels are combined, overall there is little, if any, gain in household response rates. Therefore, we have concluded that the gains in response rates are small in comparison to the cost of sacrificing other gains available from abutting panels, especially since combining panels is rarely done in practice.

### B.3 Attrition Observations

In summary, we observe that:

- o The overall attrition of longer panels will be only slightly higher than the final attrition rate for the current panels (25 versus 21 percent).
- o Since most of the attrition occurs in the first year of a panel, overlapping panels after the second year would do little to reduce attrition.
- o If panels are not combined (and they rarely are) the attrition rates for the overlapping design are identical to those for an abutting design.

### C. Attrition Research

Much research on attrition in the SIPP has been conducted. The first section below gives results from this research. The current research program is described in the second section. Integration of these research results will result in a weighing and imputation system that will reduce attrition bias for the key SIPP estimates.

#### C.1 Research Results

Research results show that the SIPP attrition rates differ by characteristics and that the current weighing and imputation procedures could be modified to reduce attrition biases. A study by McArthur (1987), based on all 9 waves of the 1984 panel, compares characteristics of persons for whom all interviews were completed with the characteristics of persons for whom there were

one or more noninterviews. Selected results are shown in Table 6. Persons with the following attributes had higher rates of nonresponse:

- o residence in metropolitan areas of 500,000 or more persons;
- o residence in rented living quarters;
- o non-White race;
- o children and other relatives of the reference persons;
- o age 15 to 24;
- o mover;
- o never-married;
- o no savings accounts or other assets (Jabine, et al., 1990).

Research by McCormick (1992) using the 1984 panel shows that never-married persons, persons aged 15-34, and renters tend to move more often than other persons. Additionally the results suggest that we might reduce mover nonresponse bias for estimates associated with tenure, marital status, and hours worked per week by introducing an adjustment for mover nonresponse.

An investigation by Sanchez (1991) shows that the current SIPP cross-sectional nonresponse adjustment categories, while not fully accounting for attrition of low monthly income households, do reduce nonresponse bias for estimates of monthly mean and median income. They essentially have no effect on program participation estimates. The research also suggests the inclusion of monthly income categories into the nonresponse adjustment procedure may help reduce bias.

Singh et al. (1990) used 1984 panel data to explore imputing

data for cases with one missing interview for panel, calendar year 1, and calendar year 2 estimates. They estimated that this approach reduces standard errors about 3.0, 2.4, and 1.8 percent, and reduces the number of noninterviews by about 17.5, 21, and 12 percent for the three estimates, respectively. They also noted that for most type of estimates this approach reduces nonresponse bias and provides many more waves of data from cases originally classified as noninterviews. The method does introduce a bias in transition and spell estimates. However, it is small -- the estimated maximum percent of transitions missed in a panel is 2.3% -- and occurs at the wave level.

### C.2 Current Research

Results from several research projects designed to investigate ways to reduce attrition bias will be available by the end of 1993, in time to implement changes before the redesigned SIPP panel is introduced.

As a result of the McCormick study (1992), a project is investigating the ability of a mover nonresponse adjustment to reduce attrition bias in important SIPP estimates (Petroni, 1992). Since Singh et al.'s (1990) findings were promising, the University of Michigan (UM) is pursuing further research on the imputation issue. The UM research is exploring the imputation of multiple waves of missing data, as well as imputation for missing items. The work should permit SIPP to use more available data and, hence, reduce the bias.

Additionally, two research projects using results from

McCormick (1992), Sanchez (1991), and McArthur (1987) are exploring alternative model-based weight adjustments. The alternative approaches allow more known information to be used to adjust weights than the current weighing procedures. We believe that the incorporation of these extensive research results will further reduce bias due to attrition.

#### D. Abutting Panels in the SIPP

Existing research thus supports adoption of an abutting panel design for the SIPP for the following reasons:

- o The overlapping panel design was initially instituted in the SIPP because of concerns about time-in-sample bias. Extensive research both within and outside the Census Bureau has found no evidence of significant data problems caused by time-in-sample bias.
- o The overall attrition rate will increase only marginally from the current design.
- o Approximately two-thirds of the attrition occurs in the first year. Hence, overlapping panels at the second year does little to reduce attrition.
- o Through weighing and imputation improvements, the Bureau expects to, at minimum, eliminate the effects of any increase in attrition.
- o The panels will be much larger (50,000 households), allowing for analyses of subgroups not possible with the smaller panels.
- o Overlapping panels reduce the flexibility of extending the

Bureau Memorandum to the SIPP Nonresponse Working Group, November 20.

McCormick, M. (1992), "Evaluation of Characteristics Related to Moving and Nonresponse," Internal Census Bureau Memorandum for Documentation, October 1.

McCormick, M., D. Butler, and R. Singh (1992), "Investigating Time-in-Sample Effect for the Survey of Income and Program Participation", Draft paper presented at American Statistical Association Meeting.

Pennell, S., and J. Lepkowski (1992), "Panel Conditioning Effects in Survey of Income and Program Participation", Draft paper presented at American Statistical Association Meeting.

Petroni, R. (1992), "Mover Nonresponse Adjustment Research for the SIPP," Presented at the Third International Workshop on Household Nonresponse, Central Bureau of Statistics, Voorburg, Netherlands, September 14-16, 1992.

Sanchez, M. (1991), "SIPP 85: Evaluation of the Nonresponse Adjustment Procedure," Internal Census Bureau Memorandum for Singh, June 24.

Singh, R., V. Huggins, and D. Kasprzyk (1990), "Handling Single

Wave Nonresponse in Panel Surveys," Presented at the Survey Design, Methodology and Analysis Conference, University of Essex, Colchester, U.K., July 4-7, 1990.

Table 1. Household Sample Loss Rates in SIPP by Panel and Wave

Wave/Panel	1990 <sup>1</sup>	1988	1987	1986	1985	1984
1	7.1	7.5	6.7	7.3	6.7	4.9
2	12.6	13.1	12.6	13.4	10.8	9.4
3	14.4	14.7	14.2	15.2	13.2	12.3
4	16.5	16.5	15.9	17.1	16.3	15.4
5	18.8	17.8	18.1	19.3	18.8	17.4
6	20.1	18.3	18.9	20.0	19.7	19.4
7	21.0	19.3*	19.0	20.7	20.5	21.0
8	22.0*	20.3*	20.0*	21.7*	20.8	22.0
9	23.0*	21.3*	21.0*	22.7*	21.8*	22.3
10	24.0*	22.3*	22.0*	23.7*	22.8*	23.3*
11	25.0*	23.3*	23.0*	24.7*	23.8*	23.4*
12	26.0*	24.3*	24.0*	25.7*	24.8*	24.4*

\* These sample loss rates are projected assuming a 1% increase in sample loss at each wave.

<sup>1</sup> Sample loss rates are calculated without the 1989 panel cases which were included as part of the 1990 panel.

Table 4. Wave-by-Wave Attrition Rate Comparison by Design

Design	Wave												
	1	2	3	4	5	6	7	8	9	10	11	12	
Current Panel													
Nonoverlap (A)	6.7	12.0	14.0	16.3	18.4	19.4	20.2	21.1					
Overlap (B)	11.5	15.2	16.7	11.5	15.2	16.7	11.5	15.2					
4-Year Panel													
2-Year Overlap (C)	13.4	16.6	18.0	19.6	21.2	22.2	13.4	16.6	18.0	19.6	21.2	22.2	
Abutting (D)	6.7	12.0	14.0	16.3	18.4	19.4	20.2	21.1	22.0	23.0	24.0	25.0	
Differences Between:													
C&B Designs (C-B*)	1.9	1.4	1.3	8.1	6.0	5.5	1.9	1.4					
D&B Designs (D-B*)	-4.8	-3.2	-2.7	4.8	3.2	2.7	8.7	5.9					
D&C Designs (D-C)	-6.7	-4.6	-4.0	-3.3	-2.8	-2.8	6.8	4.5	4.0	3.4	2.8	2.8	

Comparisons weren't done beyond 8 waves since the current design has only 8 waves.

Table 5. Annualized Attrition Rate\*. Comparison by Design

Design	Year			
	1	2	3	4
Current Panel				
Nonoverlap (A)	12.1	18.5		
Overlap (B)	15.3	15.3		
4-Year Panel				
2-Year Overlap (C)	16.8	20.2	16.8	20.2
Abutting (D)	12.1	18.5	21.4	24.4
Differences Between:				
C&B Designs (C-B**)	1.5	4.9		
D&B Designs (D-B**)	-3.2	3.2		
D&C Designs (D-C)	-4.7	-1.7	4.6	4.2

\* Rates reflect a completely phased-in design.

\*\* Comparisons were not done beyond 8 waves since the current design has only 8 waves.

Table 6. Selected Characteristics of Persons by Their Interview Experience for the Full 1984 Panel

CHARACTERISTICS OF PERSONS IN WAVE 1	INTERVIEW EXPERIENCE (% distribution)			
	COMPLETED ALL	MISSED at Least Last 2	OTHER* MISSED 1	MISSED 2+
<b>Relationship</b>				
Ref. persons	37.3	33.1	33.9	30.7
Primary Ind.	12.7	14.7	13.4	12.0
Spouse	31.3	23.9	25.4	23.9
Child	13.9	17.9	18.4	24.1
All Other	4.8	10.3	9.0	9.4
<b>Age</b>				
15-24	18.2	24.2	25.3	29.5
25-34	22.1	21.4	22.6	22.9
35-44	17.3	14.4	17.0	14.9
45-64	27.0	23.2	21.5	23.2
65+	15.4	16.8	13.6	9.5
<b>Race</b>				
White	88.5	83.8	82.9	78.2
Black	9.2	12.9	13.9	17.6
Other	2.3	3.3	3.2	4.2
<b>Living Quarters</b>				
Owned	72.7	62.9	65.6	59.8
Rented	24.8	35.1	32.1	37.3
Rent Free	2.4	2.0	2.3	2.8
<b>Marital Status</b>				
Never Married	20.8	28.8	28.3	33.6
Married	63.5	52.2	53.3	50.4
Other	15.8	18.9	18.5	15.9
<b>Savings Account</b>				
Yes	59.9	51.1	51.9	51.0
No	40.1	48.9	48.1	49.0

\*Interview experience categories are mutually exclusive. At least one of the last two interviews was completed for persons in the "other" category.