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I. Introduction

This paper presents results of two studies conducted to evaluate the Survey of Income and Program Participation's (SIPP) cross-sectional household noninterview adjustment variables. The first study evaluates the current noninterview adjustment procedure. (See Section IV.) Specifically, it analyzes the effectiveness of this procedure at reducing nonresponse bias. The second study, given in section V, examines whether nonresponse adjustment by mover/nonmover status reduces biases. Before providing the details of the studies and their respective results, the paper presents an overview of the design and content of the SIPP in section II and describes the weighting methodology in section III.

II. Design and Content of the SIPP

The SIPP is a nationally representative survey program of the U.S. Bureau of the Census. It obtains information about the financial situation of persons, families, and households in the noninstitutionalized population of the United States. The information includes data on cash and noncash income, eligibility and participation in various government transfer programs, labor force status, assets and liabilities, and many other topics (e.g. work history, marital history, educational attainment, etc.)

The SIPP is a continuing survey with new national probability samples of households (panels) introduced each year. For most panels, sample households are interviewed every four months for about 2½ years (8 interviews). At each interview data is collected for the four months prior to the interview month. To facilitate field and processing operations, each panel is divided into four approximately equal subsamples (i.e., rotation groups). Only one rotation group is interviewed in a given month so that one cycle (i.e., wave) of interviewing, in general, requires four consecutive months.

Interviewing for the 1984 and 1985 panels began in October 1983 and February 1985, respectively. The 1984 panel began with 20,000 occupied and eligible households. In March 1985 (the middle of the fifth interview), 17.8% of the eligible sample was dropped. The 1985 panel started with about 17,000. In February 1986 (the second rotation of wave 4), roughly 15% of the sample was dropped. For both panels, sample was dropped due to budget

constraints.

All persons in a sample household at the time of the first interview remain eligible for interviewing even if they move to new addresses. At each interview, information is obtained for each person who is 15 or more years old. In addition, persons aged 15 and over who subsequently share living quarters with original sample persons (individuals who were living in an interviewed sample unit at the time of the first interview) are interviewed as long as they reside with an original sample person. Such persons are movers into households. Generally, no attempts are made to interview nonrespondents in subsequent waves. (Nelson, et.al. (1985).)

III. Weighting Overview

The final SIPP weights include several stages to account for sampling, household nonresponse, and coverage errors, with the intent of reducing the mean square error of estimates. Except for the 1984 panel, the cross-sectional weighting procedure includes a Hispanic adjustment. (U. S. Department of Commerce (1988b, 1988c, 1988d).)

The weighting procedure partitions interviewed and noninterviewed households into weighting classes by values of variables available for respondent and nonrespondent households. Separate nonresponse adjustment factors are obtained for each weighting class by dividing the weighted count of interviewed and noninterviewed households by the weighted count of interviewed households. (Singh and Petroni (1988).)

At the time of the first SIPP interview little information is available about the noninterviewed households. Therefore, a limited number of variables are used to form noninterview classes. (See U.S. Department of Commerce (1988b, 1988d).)

The subsequent waves' noninterview adjustments are in addition to the Wave 1 noninterview adjustment. In subsequent waves, additional information obtained on previous wave respondent households is available for forming weighting classes. This information includes: Tenure (owner, renter); Public housing or rent subsidized (resident of public housing or recipient of government rent subsidies, others); Type of income (welfare etc., others); Household type (female householder with own children under 16 years of age but no husband present, householder is 65 years of age or older, others); Assets (bonds etc., others); Education

level of reference person (less than 8 years, 8-11 years, 12-15 years, 16 or more years); Race and Spanish origin of reference person (non-Spanish white, other); and Household size (1, 2, 3, 4 or more). The welfare etc. category includes income sources such as Federal Supplemental Security Income; State Supplemental Security Income; Aid to Families with Dependent Children; Women, Infants and Children Nutrition Program; food stamps; and Medicaid. The bonds etc. category includes households in which at least one member possesses at least one asset type other than regular/passbook savings accounts in a bank, savings and loan or credit union or NOW, Super NOW or other interest-earning checking accounts. (U.S. Department of Commerce (1988c, 1988d).)

IV. Evaluation of the Nonresponse Adjustment Procedure

A. Why Conduct this Evaluation Study?

In Petroni and King (1988), we assumed that the current nonresponse adjustment procedure is adequate for Waves 1 and 2, and used the 1984 panel to evaluate how well it accounts for nonresponse bias in estimates at later waves, when the nonresponse rates are higher. (By the last wave the rate is over 20%.) The study which used SIPP final weights, suggested that monthly household cash income categories, metropolitan/nonmetropolitan status categories, and a further breakdown of the current race and Hispanic origin categories be considered to define weighting classes. However, since final weights for the 1985 and later panels, unlike those for the 1984 panel, include an Hispanic adjustment, repeating the study using 1985 panel data could result in different conclusions. Hence, the current study uses 1985 panel data to re-examine the issue.

B. The 1985 Panel Evaluation Project

To evaluate the noninterview adjustment for later waves, ideally data for the later wave's noninterviews would be available. Estimates calculated with their actual data could then be compared to the SIPP estimate, in which their data are missing. Of course, this is impossible since by definition these data are missing.

To approximate such a comparison, we used t-tests to compare two sets of second quarter 1985 estimates of selected socioeconomic characteristics. The estimates were based on final weights and households in sample at Wave 2 of the 1985 panel which were not later dropped from sample due to budgetary constraints. One estimate (W2/W2) was based on the actual Wave 2 household interview status. The other estimate (W2/W6) treated Wave 2 noninterviewed households and households which

were interviewed at Wave 2 but not interviewed at Wave 6 as noninterviews. (Determination of the Wave 6 interview status is described in Petroni and King, 1988). We assumed that a household's Wave 2 characteristics are similar to its characteristics at Wave 6 to approximate the actual situation at the later wave.

Variances were calculated using SIPP generalized variance parameters (GVP). GVPs for W2/W2 estimates were obtained by adjusting the SIPP 1985 panel Wave 2 GVPs to account for the sample cut. GVPs for W2/W6 estimates were obtained by adjusting the W2/W2 GVPs to account for the additional sample loss associated with W2/W6 estimates. Correlation between the households in common was estimated to be $\sqrt{7500/8400}$ where, for the three rotations of Wave 2, 7500 and 8400 are respectively the number of Wave 2 households classified as interviewed at Wave 6 and the number interviewed at Wave 2. (Approximately 11,000 households were eligible for interview at Wave 2.)

C. Evaluation of Findings.

1. Household Level Estimates

Tables 1 and 2 provide estimates of households with cash income; mean and median monthly cash income; number of households; and percent of persons in households receiving unemployment compensation, means tested benefits, cash benefits, and food stamps.

Table 1 shows W2/W6 median income to be significantly higher and W2/W6 mean income to be higher (although not statistically) for total, White, and Black; W2/W6 number of households, mean income, and median income for wages and salaries to be significantly higher; W2/W6 median and mean income to be significantly higher for metropolitan and large metropolitan areas (i.e., 1,000,000+ population); W2/W6 mean and median income to be higher (although for most not significantly) for most of the other characteristics; and W2/W6 number of low income households to be significantly lower and W2/W6 number of high income (2.00 or more times low income) households to be significantly higher. These findings suggest that the "type of income" noninterview categories do not fully account for attrition of low income households.

Of the significant income differences, only the differences for Black median income, and metropolitan and large metropolitan areas mean and median incomes are deemed important by analysts. While the differences in most W2/W2 and W2/W6 estimates in this table are not analytically important, they could have implications for analyses which compare incomes for different sub-

populations if the degree of bias differs by sub-population. Thus, we may want to consider the use of "monthly income amounts" categories. Consideration would include investigation of the operational feasibility of using such categories.

Overall in table 2 we did not observe any systematic pattern of differences between the W2/W2 and W2/W6 program participation estimates. However, W2/W6 unemployment compensation estimates are significantly lower for Blacks, Hispanics, male headed non-family households and for households residing in large metropolitan areas. These differences are also judged important by analysts. For other types of program participation estimates, there are significant differences between the two estimates for total households, Hispanic households, married couple households, other family households, female-headed non-family households and households residing inside and outside metropolitan areas. Most of these differences are at least marginally important to analysts.

The W2/W2 and W2/W6 estimates were about the same for the majority of the program participation estimates. However, about 25% of the differences are significant. Statistically, we'd expect only 10% to be significant if there was no affect. Because no systematic patterns of differences exist, the results of table 2 don't point to a particular problem with estimates of program participation using the current SIPP noninterview adjustment procedures.

2. Person Level Estimates.

Estimates of number of persons with income; mean and median monthly income; persons in households; percent in households receiving unemployment compensation, means tested benefits, cash benefits, noncash benefits, and food stamps; and percent of persons in low income (cash only) households were also examined.

The results of these analyses suggest that the potential changes to the noninterview cells identified above for household estimates may at least marginally improve person level estimates.

D. Conclusion

Results of this project suggest that research be conducted to determine whether inclusion of "monthly household income" categories should be considered for noninterview adjustment. Use of "monthly household income" categories was also identified in the similar study conducted on the 1984 panel. Unlike the 1984 panel study, there is not evidence we should consider "metropolitan/nonmetropolitan" categories or a further breakdown of "race and Spanish origin" categories. (Petroni and King, 1988). The use of an Hispanic

adjustment in the 1985 panel may account for these differences.

We intend to extend the current analysis to other variables such as education and work disability. Additionally, we want to examine whether the present nonrespondent adjustment is reducing bias. We will do this by leaving out the nonresponse adjustment procedure and forming two new sets of estimates to correspond to W2/W2 and W2/W6. Again t-tests will be used to compare the two sets of estimates to W2/W2.

V. Mobility and Nonresponse Characteristics

A. Why Assess Mobility and Nonresponse Characteristics?

In the SIPP, if an original sample person moves during the life of the panel, a field representative attempts to obtain subsequent interviews by contacting the individual at his/her new address. The exception is, the individual who moves more than one hundred miles from a SIPP sample PSU and can not be reached by telephone. If attempts were not made to follow movers, the SIPP would have lost approximately 28 percent of its sample by the final wave of the 1984 panel. (See U.S. Bureau of the Census 1988a) Such a high rate of attrition would result in a serious loss to our available sample size for analysis. Unfortunately, it is impossible to keep all movers in sample and, hence, nonresponse results. Our noninterview adjustment attempts to compensate for nonresponse. However, there is some belief that bias could be reduced if we specifically adjusted for mover nonresponse. (See DeAre, 1990) Hence, we are exploring this issue.

B. The Evaluation Project.

1. Input File

The characteristics used in the evaluation project were obtained from an extract file of the eight 1984 Panel Cross-Sectional wave files. The file, not longitudinally edited, contains unweighted data for all 15+ original sample persons and those who subsequently share living quarters with an original sample person after the first interview. Persons dropped in the March 1985 sample cut are not on the file.

2. Definitions.

The following definitions should be introduced before proceeding.

- a. Respondent - a person completing an interview.
- b. Nonrespondent - a person eligible for interview, but not completing an interview.
- c. Mover - a person who changed address during the four reference months prior to the current interview. A person was not considered a mover

unless he/she moved after entering a sample household.

d. Nonmover - a person who did not change address during the four reference months prior to the current interview.

Combinations of these definitions, such as a respondent nonmover which satisfies both the respondent and nonmover definition, are used in the following procedure.

3. Procedure.

The project was carried out similarly for each subsequent interview. Individuals present at the particular interview were classified as a respondent nonmover, respondent mover, nonrespondent nonmover or nonrespondent mover based on their interview/mover status at that interview. (See section B. 2. for definitions. Note that any individual entering the sample in the second interview was classified as a nonmover.) After classifying all individuals, SPSS (the Statistical Package for the Social Sciences) was used to create the distributions for each classifications for a set of characteristics. Chi square tests, adjusted to account for the design effect (D.E. = 3.0), were used to compare the distributions. The comparisons were:

- 1) Respondent vs. Nonrespondent,
- 2) Respondent nonmover vs. Nonrespondent nonmover,
- 3) Respondent mover vs. Nonrespondent mover,
- 4) Respondent nonmover vs. Respondent mover, and
- 5) Nonrespondent nonmover vs. Nonrespondent mover.

The characteristics of respondent nonmovers were from the current interview. Characteristics of all other persons were from the interview before the most recent move or noninterview.

C. Evaluation

We used the results of the comparisons to determine whether the distribution of respondent movers and nonrespondent movers were significantly different from respondent non-movers and nonrespondent non-movers, respectively. In addition, we considered whether the distribution of the two mover groups were more similar to each other than to the distribution of total respondents. We similarly considered the distributions of the two non-mover groups. We used results from these three analyses to speculate what impact a mover NI adjustment would have on the estimates.

The current evaluation concentrated on two out of the seven interviews, the third and the seventh interview. Table 3 shows the results of the third interview. Superscripts next to characteristics indicate which comparisons show significant differences. For example, a superscript of 1 next to a characteristic indicates a significant differ-

ence between respondents and nonrespondents.

Characteristics marked 4 and 5 are ones for which the distributions of mover groups differ from their respective non-mover groups. For such characteristics, if respondent and nonrespondent nonmovers are not significantly different and respondent and nonrespondent movers are not significantly different (i.e. comparisons 2 and 3), gains from a mover nonresponse adjustment are expected. However, gains may still occur even if comparisons 2 or 3 are significant. Gains could occur in these cases if in general for each sub-characteristic in the distribution both the percentage of respondent mover (nonmover) and the percentage of nonrespondent mover (nonmover) appear to be greater or less than the total respondent percentage.

After comparing results from the third and seventh interviews, it appeared that for some characteristics a movers adjustment may help estimates. Marital status, cash benefits, age, poverty, tenure, and employment status would generally show improvement for both movers and non-movers. For non-cash benefits food stamp estimates may improve, but estimates of "other" types of benefits may not. For education, monthly person income, and race, it is not clear whether in general estimates would be improved or hurt. For ethnicity, we feel separating movers and non-movers would neither help nor hurt.

D. Conclusion

The issue explored here was whether bias could be reduced for certain characteristics if we separately adjusted for mover nonresponse. For six out of the eleven characteristics that were examined we found evidence that suggested some improvement would be possible. The results given here were preliminary with the remaining interviews yet to be analyzed. Future plans include looking at the characteristics of movers with interviews before and after the move to see how movement affects person characteristics.

VI. Summary

Further research is suggested by results of both studies presented here. Results from the first study suggest we further investigate the use of "monthly household income" categories as nonresponse adjustment cells. Results from the second study suggest that use of a mover/nonmover nonresponse adjustment may reduce the bias of some estimates. For others it is not clear whether overall the adjustment helps or hurts. Hence, further research is needed.

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ACKNOWLEDGMENTS

The authors are grateful to Kathy Quade and Sandra Carnegie for typing our paper; Lam Nguyen-Nhu, Zelda McBride, and Donna Riccini for data processing support; and Elaine Hock for reviewing weighting outputs.

Table 1. Monthly Cash Income For Households (HHs), Second Quarter 1985

	Number of HHs (In Thousands)		Mean Income		Median Income	
	W2/W2	W2/W6	W2/W2	W2/W6	W2/W2	W2/W6
All Races	85823	85744	2335	2346	1821	1842 *
White	74150	74201	2430	2438	1914	1935 *
Black	9484	9461	1593	1595	1266	1297 *
Hispanic (1)	4757	4730	1815	1806	1475	1495
"Low" Income (LI)	11275	10881 *	405	408	357	358
1.00 to 1.24 LI	4459	4416	721	726	622	622
1.25 to 1.49 LI	5011	4992	953	958	832	834
1.50 to 1.99 LI	8992	8919	1237	1244	1089	1098
2.00 + LI	56087	56535 *	3151	3142	2586	2584
Wages and Salaries	59655	60005 *	2299	2316 *	2300	2319 *
Social Security	23780	23919	583	582	1191	1200
AFDC	2769	2757	359	361	528	526
Federal SSI	3111	3294 *	261	263	592	576
Means Tested Bene.	7422	7547	904	918	599	592
Family Households (HHs)	61540	61564	2665	2679	2165	2180 *
Married-Couple HHs	49244	49195	2916	2930	2398	2410
Other Family HHs	6061	6164	2100	2134	1733	1759
FHHer NSPMC (2)	6236	6204	1230	1233	907	917
Nonfamily Households	NA	NA	NA	NA	NA	NA
Male Householder	10268	10178	1989	1973	1489	1510
Female Householder	14015	14002	1144	1152	821	835
Metropolitan	67194	66844 *	2460	2479 *	1940	1975 *
>1,000,000	42174	41471 *	2581	2608 *	2049	2087 *
<1,000,000	25020	24472 *	2255	2268	1762	1773
Nonmetropolitan	18629	18900 *	1887	1875	1531	1532

Table 2. Receipt of Benefits, Second Quarter 1985

	Number of households (In Thousands)		Percent in HHs Receiving Benefits from							
	W2/W2	W2/W6	Unemployment Comp.		Total		Cash Benefits		Food Stamps	
All Races	85823	85744	2.7	2.6	18	18.1	8.6	8.8 *	7	7.1
White	74150	74201	2.6	2.7	14.6	14.8	6.8	6.9	4.9	5
Black	9484	9461	3.2	2.3 *	61.4	61.2	21.3	21.6	21	21.5
Hispanic (1)	4757	4730	6.6	5.5 *	35.7	37.6 *	18.1	18.5	15.4	15.4
Family Households (HHs)										
Married-Couple HHs	49244	49195	3.1	3	11.6	11.6	4.6	4.8 *	3.1	3.2
Other Family HHs	6061	6164	3.2	3.4	28.7	28.2	17.8	16.9 *	10.9	9.6 *
FHHer NSPMC (2)	6236	6204	3.3	3.4	55.2	55	32.5	33.3	36.6	37.3
Nonfamily Households										
Male Householder	10268	10178	2.5	2 *	12.4	12.9	5.6	5.3	4.3	4.4
Female Householder	14015	14002	1	1	23.1	23.9 *	10.4	11.1 *	7.9	8.4 *
Metropolitan	67194	66844 *	2.5	2.4	17.3	17.3	8.6	8.7 *	6.8	6.9
>1,000,000	42174	41471 *	2.7	2.5 *	17.3	17	8.9	9	6.7	6.7
<1,000,000	25020	25373 *	2.2	2.2	17.3	17.7	8.2	8.4	7	7.2
Nonmetropolitan	18629	18900 *	3.5	3.7	20.4	20.9	8.6	9 *	7.7	7.9

* W2/W2 and W2/W6 estimates are significantly different at the 10 percent significance level.

NA = Not available.

(1) Hispanics are also included in White or Black.

(2) FHHer NSPMC = Female householder, no spouse present, with own children under 18 years of age

Table 3. Comparison for Evaluation of Mover Characteristics by Mover and Response Status for Interview 3

Characteristic	Total in Scope	Respondent			Nonrespondent		
		Total	Non-Mover	Mover	Total	Non-Mover	Mover
MARITAL STATUS^{1,2,3,4,5}	34116	31291	29200	2091	2825	2219	606
married with spouse	19777	58.5	59.5	45.5	52.5	56.3	38.9
married no spouse	177	.5	.5	.8	.8	.6	1.5
widowed	2451	7.3	7.6	3.5	5.0	5.8	2.0
divorced	2367	6.8	6.5	10.5	8.0	6.3	13.8
separated	800	2.3	2.2	3.6	3.1	2.2	6.3
never married	8544	24.6	23.7	36.1	30.1	28.6	37.3
EDUCATION^{1,2,3,4,5}	34183	31327	29227	2100	2856	2222	634
< 8 years	3569	10.7	11.1	5.7	7.7	7.8	7.3
9-11 years	5814	16.8	16.8	17.4	18.9	17.1	25.1
12 years	12377	36.1	36.1	36.8	36.9	36.9	36.9
13+ years	12423	36.3	36.1	40.1	36.5	38.2	30.8
CASH BENEFITS^{1,2,4,5}	34378	31512	29405	2107	2866	2230	636
received	2940	8.7	8.5	10.8	7.0	5.4	12.9
not received	31438	91.3	91.5	89.2	93.0	94.6	87.1
AGE^{1,2,4,5}	34378	31512	29405	2107	2866	2230	636
15 to 24	7885	22.6	21.3	41.3	26.6	23.2	38.5
25 to 34	7431	21.6	20.8	33.1	21.4	18.3	32.1
35 to 44	5516	16.1	16.4	12.0	15.7	16.3	13.5
45 to 64	8640	25.0	26.2	8.9	26.1	29.7	13.5
65+	4906	14.6	15.4	4.7	10.2	12.5	2.4
POVERTY^{1,3,4,5}	34191	31360	29256	2104	2831	2220	611
<75%	2437	6.9	6.4	13.1	9.8	7.5	18.2
75 to 99%	1381	4.0	4.0	4.4	4.0	2.8	8.2
100 to 149%	3202	9.2	9.2	9.5	10.7	9.9	13.4
150 to 249%	7120	21.0	20.8	23.7	18.7	18.2	20.3
250% +	20051	58.8	59.5	49.4	56.9	61.5	39.9
TENURE^{1,4,5}	33538	30737	28698	2039	2801	2187	614
owner	23938	71.9	74.3	38.7	65.2	73.4	35.7
not owner	9600	28.6	25.7	61.3	34.8	26.6	64.3
EMPLOYMENT STATUS^{1,4,5}	34378	31512	29405	2107	2866	2230	636
with job	20938	60.9	60.5	65.6	61.1	60.6	62.7
no job	1644	4.6	4.3	9.0	6.8	4.9	13.2
not in labor force	11796	34.5	35.2	25.3	32.1	34.4	24.1
NON-CASH BENEFITS^{2,4,5}	34378	31512	29405	2107	2866	2230	636
Food Stamps	2339	6.8	6.5	12.1	6.5	3.9	15.6
Other	2921	8.4	8.0	13.1	9.9	8.7	14.3
None	29118	84.8	85.5	74.8	83.6	87.4	70.1
INCOME MONTHLY⁴	34378	31512	29405	2107	2866	2230	636
< 300	9438	27.1	26.7	31.6	31.8	30.5	36.0
300 to 599	5422	15.8	16.0	13.9	15.0	14.1	18.1
600 to 899	4386	12.7	12.6	14.0	13.0	12.9	13.4
900 to 1199	3606	10.6	10.5	11.8	9.7	9.6	9.9
1200 to 1599	3626	10.6	10.5	11.6	10.0	10.6	8.0
1600 to 1999	2472	7.3	7.3	7.0	6.3	6.7	4.7
2000 to 2999	3234	9.5	9.8	6.2	8.1	8.7	5.8
3000 to 3999	1147	3.4	3.4	2.4	3.1	3.1	3.0
4000+	1047	3.0	3.2	1.5	3.1	3.6	1.1
RACE	34378	31512	29405	2107	2866	2230	636
White	29833	87.0	86.9	88.3	84.4	84.9	82.9
Black	3646	10.4	10.5	8.7	12.8	12.8	13.1
Native American	142	.4	.4	.7	.5	.3	1.4
Asian	757	2.2	2.2	2.2	2.2	2.1	2.7
ETHNICITY^{3,5}	34378	31512	29405	2107	2866	2230	636
Spanish	1901	5.4	5.4	5.8	6.5	4.8	12.3
Non-Spanish	32477	94.6	94.6	94.2	93.5	95.2	87.7

¹ Distributions of respondents and nonrespondents sign. diff. at 0.10 level.

² Distributions of respondent nonmovers and nonrespondent nonmovers sign. diff.

³ Distributions of respondent movers and nonrespondent movers sign. diff.

⁴ Distributions of respondent nonmovers and respondent movers sign. diff.

⁵ Distributions of nonrespondent nonmovers and nonrespondent movers sign. diff.