

Housing Subsidies in a Measure of Poverty¹

Sharon Stern
Chief, Poverty and Health Statistics Branch
Housing and Household Economic Statistics Division
U.S. Census Bureau

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The objective of this paper is to review available research regarding the valuation of housing subsidies for inclusion in a measure of poverty. The introduction reviews the recommendations of the National Academy of Sciences (NAS) Panel on Poverty and Family Assistance (the panel), which motivate most of the subsequent research. The second section describes the valuation method currently used in the Current Population Survey (CPS). Following that in the third section is a review of each of 3 research papers that presented new methods for valuing housing subsidies on the CPS. The fourth section includes a review of 2 research papers that described applications of the subsidy valuation methods to measuring poverty in the Survey of Income and Program Participation (SIPP). The fifth section reviews the methods used in each of the official experimental poverty reports. The final section summarizes the themes of the assorted research efforts and reiterates some of the benefits and potential limitations of various methods.

I. Introduction

The panel analyzed the methods, concepts, and definitions currently used to determine the official poverty level from the Annual Social and Economic Supplement (ASEC) of the CPS. In addition, the panel investigated the possible effects of implementing their recommendations for changes to the poverty concept and the measurement methods. The panel then released their recommendations for improvements to the official measurement of poverty in three main areas: the concept of a threshold, the definition of resources, and the adjustments necessary for geographic and family size equivalence. In the area of resources, the panel recommended that the value of noncash benefits be added to a family's resources for the determination of the family's poverty status.

Recommendation 4.2 *The definition of family resources for comparison with the appropriate poverty threshold should be disposable money and near-money income. Specifically, resources should be calculated as follows:...- add the value of near-money non-medical in-kind benefits, such as food stamps, subsidized housing, school lunches, and home energy assistance ...*²

¹ This paper is released to inform interested parties of research and to encourage discussion.

² Citro, Constance F. and Robert T. Michael, *Measuring Poverty: A New Approach*. Washington, DC, National Academy Press; 1995. p. 209.

This paper reviews research on the valuation of housing subsidies, one of the non-medical in-kind benefits specifically mentioned in the panel's report. Although the cost of housing is a major expense for U.S. families and a key element in the evaluation of need included in the development of the thresholds, this paper does not investigate the concurrent recommendation with regard to including shelter costs as part of the threshold. As discussed in Garner and Short (2001), the approach to adding a "cost" of shelter to thresholds should be consistent with the valuation of a housing-based benefit. For example, if the cost of shelter is based on out-of-pocket expenditure data, then a family living in public housing faces lower cost than they would pay without the subsidy. That family's evaluated need for housing services would be artificially low. Furthermore, to then add the value of housing subsidy to the family's resources would be in essence unbalanced. That value could easily exceed the "need" as valued in the threshold. This paper addresses only the resource side of valuing housing subsidies and implicitly assumes that the relevant threshold in any poverty measure includes the cost that this benefit is intended to meet.

Although the CPS ASEC does include an estimate of the monetary value of the housing subsidy, the panel found several shortcomings in the procedure used to produce those estimates. While the panel did not offer a definitive alternative to the current method, they did suggest that research focus in several areas. To summarize, the panel suggested that the Census Bureau address each of the following concerns with the valuation method that was then (and still is) used in the CPS.

1. Given that the previous estimates of the total value of housing subsidies fell short of the outlays on subsidies reported by the Department of Housing and Urban Development (HUD), the Census Bureau should focus on improving accuracy of the market values assigned to housing subsidies.
2. Despite evidence in the real estate market that housing prices vary between housing markets, the present method only differentiates the four Census regions, Northeast, Midwest, South and West. As a result, the panel concluded that the values assigned may not possess adequate differentiation for location, resulting in values that may be too high in some geographic areas and too low in others.
3. The CPS housing subsidy value estimates are based on 1985 American Housing Survey (AHS) data, which are then updated for inflation using the Consumer Price Index (CPI).

This paper describes the method currently employed in the CPS to value housing subsidies and the research into other methods evaluated by the Census Bureau since the panel issued its report in 1995. All these methods are market-value based approaches. Each uses an estimate of market rent (including utilities) and subtracts an estimate of rent paid by the household. The methods differ with regard to data sources, elements modeled, types of models and, in some cases, the assumptions underlying the method. In addition to descriptions of the methods, this paper presents some results of a sensitivity analysis showing the effect on poverty measurement of using alternative methods of housing subsidy valuation.

II. The Current Census Bureau Housing Subsidy Valuation

Since the NAS panel did not offer a specific alternative, their report used the method of estimating a market value of housing subsidies that was used on the 1993 CPS file and is still used.

The market value of a housing subsidy integrally relies on characteristics of the housing unit, which are not available from the CPS data. However, the CPS does identify people living in two types of subsidized housing. The first type is public housing, in which housing units are owned and operated by local housing authorities. The second type includes privately owned housing units that are rented at a reduced cost with reimbursement of the discount to the owner from a federal, state, or local government program, such as the Section 8 program sponsored by the Department of Housing and Urban Development (HUD.)

As explained below, the Census Bureau has been using the AHS, a nationally representative sample of housing units, as the source of information on housing subsidies. Because the CPS and AHS have different purposes and different designs, using the information from one survey in the analysis of another has inherent difficulties, including different geographic representation and few common variables. Despite these obstacles, the AHS is a natural choice for the process of estimating housing subsidy values because it identifies subsidized housing units in a more detailed fashion than the CPS. Furthermore, the AHS renters report the amount of rent and utilities they pay. As a result, the reported characteristics of the unit can be used to predict what the market value of the unit would be if the unit were unsubsidized.

The current Census Bureau method uses the 1985 AHS in the first stage of a model to estimate a value of housing subsidies. For data sets in the years after 1985, these are updated for inflation using the Consumer Price Index Residential Rent Index. The model considers the following factors as independent influences on the monthly cost of a two bedroom unit: the number of bathrooms in the unit, whether the unit has three specific kitchen appliances (refrigerator, dishwasher, and garbage disposal), whether the unit has any of four specific problems (holes in the walls, holes in the floor, peeling paint, or rats), and an index of satisfaction with community services.

In this system, the monthly housing costs for unsubsidized two bedroom units are regressed on each of the four independent variables separately for each of the four regions, Northeast, Midwest, South, and West. The estimated coefficients are then applied to the characteristics of the subsidized units, yielding an estimated market cost for the two bedroom units. The average predicted two-bedroom monthly cost less the average two-bedroom reported rent paid for each of the four regions yields the average subsidy for two-bedroom units in each of the four regions.

The region-specific average subsidies are not applied directly to families in the CPS. Rather, the AHS subsidies are adjusted for the number of bedrooms in the unit (more than two, two, or less than two) and family income (\$10,000 or more, \$6,000-\$9,999, or less than \$6000). The result is a 36-cell matrix of income by number of bedrooms by region. Each family in the CPS is assigned a subsidy from the table according to its own family income, number of bedrooms, and region.

One additional shortcoming of the current method is that the CPS does not collect information about the number of bedrooms in the unit. As a result, the current method includes a complicated procedure for imputing the number of bedrooms based on the composition of the primary family and related subfamilies (similar to HUD's approach). The aim of this procedure is to associate a family with the number of bedrooms for which they would be eligible under some standard housing subsidy programs.

III. Research by the Census Bureau: Valuing Housing Subsidies in the Current Population Survey

The Census Bureau followed the panel's recommendation by investigating potential general improvements to the accuracy of the housing subsidy valuation and undertaking efforts to incorporate the geographic variability in the model.

1997 Working Paper³

Naifeh and Eller (1997) compared five sets of estimates of housing subsidy values using 1993 and 1995 CPS files. These five types of estimates represent three main approaches with two possible variations. The first approach is the baseline, the current method as described above based on a model using the 1985 AHS. Naifeh and Eller also presented a variation of this approach by simply updating the subsidy estimates with the 1993 AHS, but making no fundamental change to the method for estimating the subsidies. This paper addressed the minimum recommendation of the NAS panel.

The second approach, designated here as the Naifeh/ Eller method, includes three main proposed improvements. First, the new method employs a set of changes to the model of market rents in the AHS and the method of applying these to families in the CPS. Second, their method specifically addresses the issue of geographic housing market variation by introducing more generically identified geographic areas into the model. Third, it updates the algorithm used to impute the number of bedrooms.

The changes to the modeling of market rents include a reformulation of the equation for estimating the market value of a subsidized rental unit. This approach modeled rents, for all units, as a function of characteristics of the unit and the household and geographic identifiers. Naifeh and Eller looked at two constructs for geographic identification based on the size of the Consolidated Metropolitan Statistical Area (CMSA) and the Primary Metropolitan Statistical Area (PMSA). Since PMSAs are areas within CMSAs, Naifeh and Eller define the size of the area in which a household resides by both. In one construct they use only 17 categories of possible sizes of the two areas. In the second construct, metropolitan areas are assigned to groups by size and by region, resulting in 48 metropolitan categories.

Another innovation of the Naifeh/ Eller method is a new approach to assigning the AHS subsidies to the families in the CPS. They developed a model in which the AHS housing subsidies are the dependent variable determined by the following independent variables: the number of bedrooms for which a family was eligible, family income, family income squared, and the metropolitan area size category. The coefficients from this model were applied to the families in the CPS to predict the relevant subsidy amount.

The third main approach to valuation procedure capitalizes on the fair market rents (FMRs) produced by HUD. This method, or a variation thereof, is used in most of the research described

³ Naifeh, Mary and T.J. Eller, "Valuing Housing Subsidies in a New Measure of Poverty Using the Current Population Survey," Poverty Measurement Working Paper, U.S. Census Bureau, 1997.

in this report and as the measure of housing subsidies in two recent reports on experimental poverty.

This alternative for subsidy valuation benefits from the extensive work already conducted by HUD. Each year HUD publishes a list of FMRs, which are essentially estimates of the 40th percentile of rent for adequate units in the relevant local housing market.⁴ Among other purposes, these rents are set for use in administering the Section 8 Housing Assistance Payments Program (Section 8).⁵ Consequently, it is a natural extension to use these rents to estimate the value of the housing assistance in the CPS by subtracting 30 percent of a family's income from the appropriately chosen FMR.⁶ A brief summary of how FMRs are determined demonstrates their usefulness for the purposes described here.

Base market rents are calculated separately for each bedroom size category. To determine these with statistical reliability for every geographically unique housing market, HUD starts with the most recent Decennial Census data (1990).⁷ For the largest metropolitan areas, HUD updates the rents intercensally using the AHS. For other FMR areas, HUD uses random digit dialing telephone surveys in conjunction with trending factors based on the CPI to update the rents with reasonable statistical accuracy. This work produces FMRs for every metropolitan area and every non-metropolitan area county in the United States updated yearly.

The appeal of this approach is three-fold. First, the methods used to establish these rents are consistent with standard housing economic and statistical principles. Second, HUD has published these rents for all geographic areas, eliminating the problem of small sample size when using the AHS national sample alone. Third, since the local housing authorities administering Section 8 and other programs use the FMRs to set the amounts for vouchers, then any effort to estimate the value of vouchers would do well to use the same source of market rent information. As a result, this paper uses the FMR technique as a comparison to the methods below.

Results

Naifeh and Eller compared and contrasted the different measurement techniques applied to both the 1993 and the 1995 CPS. This section reviews their results using the 1993 CPS.

⁴ In 2001, HUD began calculating FMRs at the 50th percentile level for 39 selected areas. For more detail on Fair Market Rents see HUD's web site, <<http://www.huduser.org/datasets/fmr.html>>.

⁵ "FMRs are used to determine payment standard amounts for the Housing Choice Voucher program, to determine initial renewal rents for some expiring project-based Section 8 contracts, and to determine initial rents for housing assistance payments (HAP) contracts in the Moderate Rehabilitation Single Room Occupancy program. Other programs may require use of FMRs for other purposes. ... Housing assistance payments are limited by FMRs established by HUD for different areas. In the Housing Choice Voucher program, the FMR is used to determine the "payment standard amount" used to calculate the maximum monthly subsidy for an assisted family (see 24 CFR 982.503). In general, the FMR for an area is the amount that would be needed to pay the gross rent (shelter rent plus utilities) of privately owned, decent, and safe rental housing of a modest (non-luxury) nature with suitable amenities." Federal Register, Vol. 68 No. 190, Wednesday, October 1, 2003.

<<http://www.huduser.org/datasets/fmr.html>>

⁶ Using an FMR approach requires an estimate of rent paid, since CPS does not ask about rent.

⁷ As of the 2004 FMRs, 1990 was still the most recent decennial Census data available. "Data from the 2000 Census were used for a small number of metropolitan areas that had submitted public comments requesting higher FMRs and where 2000 Census data showed FMRs were significantly understated. [Please note that the special 2000 Census tabulations needed to develop FMR estimates were not available when proposed FY 2004 FMRs were released.]" Federal Register, Vol. 68 No. 190, Wednesday, October 1, 2003.

**Table 1. Aggregate Value of Housing Subsidies: 1993
(Billions of Dollars)**

Source and method	Value
Department of Housing and Urban Development outlays for rental assistance	16.5
Current Population Survey Estimates	
Current Method – 1985 AHS estimates updated with CPI	10.7
Current Method – model updated with 1993 AHS	16.7
Naifeh/Eller Method – 17 geographic areas identified	12.2
Naifeh/Eller Method – 48 geographic areas identified	12.5
Fair Market Rent Method	16.6

Notes: For an explanation of the methods, see text.

CPI is the Consumer Price Index.

AHS is the American Housing Survey.

Source: Naifeh and Eller (1997).

Aggregate expenditure is one way to analyze the method of estimating subsidy value. Using HUD's reported outlays as a benchmark (\$16.5 billion for rental assistance in 1993), Naifeh and Eller found that two estimates were much closer to the benchmark than the others (see Table 1). Although Naifeh and Eller cautioned that HUD expenditure data may overstate actual support for households by as much as 7 percent, both the FMR method and the current method updated with 1993 AHS data produced closer estimates when measured against aggregate expenditure.

Average subsidy values followed the same pattern by method, varying from \$160 using the current method with the 1985 AHS estimates to \$249 using the current method with the 1993 AHS as a base.

Adding housing subsidies to income reduces the measured number and percentage of people in poverty if one uses the official poverty definition with only this one modification. Naifeh and Eller conducted a sensitivity analysis by looking at the differences in the number and percentage in poverty produced by the various valuation methods (see Table 2). Interestingly, while they found that the current method re-done using the 1993 AHS data had the highest aggregate subsidy value and the highest average subsidy value, it did not have the lowest number and percentage in poverty. The FMR method resulted in the lowest poverty rate at 14.3 percent. Clearly the distribution of the subsidy values differed between the methods.

In additional analysis of poverty among various demographic groups, Naifeh and Eller confirmed that adding housing subsidy values to income has an uneven impact. The value of subsidies reduces poverty among the elderly, from the official rate of 12.2 percent to the alternative rates which range from 10.3 percent using the FMR subsidy method to 10.8 percent using the Naifeh/Eller model. For the other age groups, the resulting decline in poverty rates was smaller. However, among the five alternatives included in their results, the differences in poverty rates were minimal and all were generally consistent with the overall pattern reported in Table 2.

Table 2. Effect of Housing Subsidies on Poverty in the Current Population Survey: 1993

Method	Number (thousands)	Percent
Official Poverty	39,265	15.1
With subsidy value added to income		
Current Method – 1985 AHS estimates updated with CPI	38,015	14.7
Current Method – model updated with 1993 AHS	37,222	14.4
Naifeh/Eller Method – 17 geographic areas identified	37,919	14.6
Naifeh/Eller Method – 48 geographic areas identified	37,922	14.6
Fair Market Rent Method	36,985	14.3

Notes: For an explanation of the methods, see text.

CPI is the Consumer Price Index.

AHS is the American Housing Survey.

Source: Naifeh and Eller (1997).

Finally, Naifeh and Eller pointed out that, when considering the effect of adding a subsidy value to income, it is important to recognize that the number of people who are considered in poverty under the official measure but not so under the alternatives represents a non-trivial portion of the poverty population. For example, the 1.25 million people classified as in poverty under the official measure and not in poverty using the current method with 1985 AHS represent 3.2 percent of that group. Under the FMR method 7.6 percent of the people officially in poverty would no longer be classified that way.

2000 Working Paper⁸

The 1997 Naifeh and Eller paper explored alternatives, but several issues remained unresolved. One such issue concerned the total estimated values of subsidies. The aggregate subsidy estimates based on the Naifeh/Eller models were lower than the reported HUD expenditures, the FMR approach, and the current model updated with a new AHS base year. Another issue involved the formulation of the model for predicting market values. The Naifeh/Eller approach was not a standard hedonic housing price application. Usually hedonic housing price models involve the characteristics of the housing unit rather than the characteristics of the renter. The Naifeh/Eller model used income and income-squared as independent variables. While these seem to be strong indicators of market price based on the high correlation between the two, the causality is not shown nor is the structure of the model theoretically supported.

As a result, the primary goal of Stern (2000) was to improve the estimation procedure so that the total value of the housing subsidy estimates – previously consistently low when compared with HUD reports of the amount spent on housing initiatives – would be closer to the HUD-reported expenses, and the variation in housing subsidy values estimated in the AHS would be adequately

⁸ Stern, Sharon M. "Valuing Housing Subsidies: A Revised Method for Quantifying Benefits in a New Measure of Poverty," Poverty Measurement Working Paper, U.S. Census Bureau, 2000.

represented in the CPS. The primary proposed revisions, together referred to as the Stern 2000 model, fell in two main areas. With regard to the model used in the AHS, the paper focused on a hedonic housing equation to calculate a market rent for subsidized households. As a method of assigning an estimated subsidy value to families in the CPS, this study proposed two alternatives: a renewed formulation of the subsidy value table approach and a new statistical match between the AHS and the CPS.

The first innovation in the paper concentrated on the AHS procedure for estimating market rent. The proposed basic equation was a standard hedonic housing price equation in semi-log form with the rent paid as the dependent variable and the set of characteristics of the unit and neighborhood as the independent variables. Whereas the Naifeh/Eller model used region, metropolitan status, and size of city to represent the differences between housing markets, Stern sought to identify places individually.

While the entire U.S. is by no means a single housing market, it is difficult to decide exactly how small the geographic area must be to constitute a single housing market. The sample size in the AHS is not large enough to treat each metropolitan area with a population of 100,000 or more separately. Furthermore, some large housing markets might have only a small sample and some smaller housing markets are not represented by any of their own housing units. Therefore, using a single hedonic price equation for all units in the United States assumes that all the marginal prices for housing characteristics are constant across geographic units and that the relevant differences among those geographic units can be adequately represented by a constant difference in price. The technique described below, therefore, relies on a single geographic identifier to express the price differences between a given metropolitan area and the rest of the country. Since the main concern being addressed is the observed differences in prices across housing markets, this assumption is critical to the process used in this analysis.

To reveal which locations had a significant impact on housing prices, a set of geographic-area dummy variables was created for the analysis. In order to determine which geographic-area dummy variables were significant in explaining housing market variation, the equation was estimated repeatedly using a stepwise procedure. At the outset, all 236 metropolitan statistical areas in the U.S. were possibilities for inclusion as an indicator of differences in housing markets. One geographic variable at a time was added to the model, which included all the structural characteristics, until no additional improvements to R-squared could be made. Further, the geographic variables were tested jointly and independently with F-tests to ensure that the set of geographic indices was significant.

Once the subset of 148 metropolitan areas was chosen, the model was estimated in its final version. The interpretation of the coefficients on the geographic dummy variables is the incremental difference in the rental price between a unit in a particular Metropolitan Statistical Area (MSA) and a unit that either is not in an MSA or is in an MSA whose rental price is not significantly different from non-MSA units. The market value of subsidized rental units was predicted using the estimated coefficients for non-subsidized rental units. The value of the subsidy was calculated as the difference between the predicted market rent and the reported amount of rent paid.

With regard to the method for assigning subsidies to the CPS based on the AHS, the paper investigated two main approaches and reported results on two variations of each.

- The first approach revised the subsidy value table currently in use by changing the characteristics which formed its dimensions but continuing to assign CPS households an average subsidy value based on the characteristics in the matrix.
- The second approach, completely different, proposed a statistical match between the AHS and CPS.

The first approach used a subsidy value table as follows. After calculating an average subsidy for a relevant group of characteristics from households in the AHS, these averages were applied to the households in the CPS with the same set of characteristics. In the simpler approach proposed in the Stern 2000 model, Metropolitan Statistical Area (MSA) was the only dimension used in the subsidy value table. Since only 148 of the MSAs in the AHS were significant in the housing equation, the subsidy value table had 149 cells. In the CPS, a household in one of the 148 identified MSAs received a subsidy equal to the average household subsidy in the same MSA in the AHS. The other CPS households were assigned the average household subsidy based on the average household subsidy of AHS households who either lived in one of the non-identified MSAs or did not live in an MSA.

In the more complicated variation, households in each MSA were grouped further by the number of people in the household as one person, two people, three people, four people, or five or more people. Since the correlation between the number of bedrooms and the number of people in the household for subsidized households is 0.685 in the AHS, this approach accounts for general geographic differences in prices and creates a proxy for the size of the unit. Unfortunately, the data is rather sparse at this degree of detail. In cases where the CPS household had no match on number of people and MSA, the MSA overall subsidy average was used.

The second approach to the assignment of AHS housing subsidy results to CPS families was statistical match of households between the two surveys. Unlike an exact match of a particular unit across two data sources, in a statistical match, each record from one data source is matched with a record from a second “donor” data source, where the matched record represents a similar unit. The general procedure used for the statistical match was to identify a cohort variable and then to define a distance function.

In this application of a statistical match, the FMRs were used to construct a cohort variable. Since the FMRs are chosen as the 40th percentile of the rental price distribution for an apartment with a specific number of bedrooms, they serve in this analysis as a proxy for the general rental price level in a specific area. Since the FMR data include a rental amount for every location in every MSA or non-MSA county in the U.S., clustering the areas into 14 distinct groups by FMR combined locations with similar rental prices.

The distance function included variables common to both surveys: number of people in the household, number of children in the household, household’s MSA, state, marital status of the householder, age of householder (65 years and over or not), race of householder, and sex of householder.

Results

Although the results were not completely conclusive due to the lack of criteria for choosing the “best” statistical match parameters, a general review of the results showed that changes to the current method and the Naifeh/Eller method are available and likely desirable. Using 1999 AHS, 1999 CPS, and 1999 FMRs, Stern compared six sets of subsidy values and resulting poverty rates based on four general approaches: the current method, the Stern 2000 model using a subsidy value table, the Stern 2000 model using a statistical match between the AHS and CPS, and finally the FMR approach.⁹

In order to isolate and then compare and contrast the two proposed methods for assigning subsidy values between the surveys, Table 3 shows some summary statistics on the distribution of household-level subsidies. The two subsidy-value table methods that assign averages based on specific characteristics do a reasonable job of replicating the AHS average subsidy on the CPS. The average by MSA and average by MSA and household size methods result in average subsidies on the CPS of \$241 and \$242, respectively. These are quite close to the average subsidy on the AHS, \$239. Conversely, they do not bring in any of the depth or richness of the information on the AHS. The standard deviation of the AHS subsidies is \$228, much larger than the standard deviation of the subsidies in the CPS using these two methods. Assigning CPS households the average subsidies by MSA has a standard deviation of only \$80. Assigning by MSA and household size has a standard deviation of \$112.

Table 3. Statistics on Household-Level Subsidies in the American Housing Survey (AHS) and the Current Population Survey (CPS): 1999 (Dollars)

Source and method	Monthly Subsidy Value						Annual Subsidy (Billions)
	Average	Minimum	25 th Percentile	Median	75 th Percentile	Maximum	
AHS	239	0	0	208	406	1275	16.7
CPS							
<i>Subsidy Value Table</i>							
MSA only	241	30	209	209	284	1044	13.9
MSA and household size	242	0	178	236	289	1044	14.0
<i>Statistical Match</i>							
Low	242	0	14	216	401	1210	13.9
High	261	0	42	228	416	1275	15.1

Notes: For an explanation of the methods, see text.
MSA means metropolitan statistical area.

Source: Stern (2000).

Table 3 also reports on the statistical matches that generate the highest and the lowest aggregate subsidies. The aggregate amount of annual housing subsidies on the AHS is \$16.7 billion compared with \$15.1 billion on the CPS with the high match and \$13.9 billion on the CPS with

⁹ The statistical match was run 74 times a variety of parameters. These results are for the match with the highest average monthly subsidy and aggregate subsidy and the match with the lowest.

the low match. For the two statistically matched estimates on the CPS, the minimum, maximum, average, median, 25th percentile, and 75th percentile estimated subsidies generally bracket the values from the AHS.

To compare the FMR method to the others, Stern (2000) reports some characteristics of the distributions at the family level. The household-level subsidies from the first methods are scaled down by the number of people in the family relative to the number of people in the household.¹⁰ One criticism levied against these different methods in earlier work was that the value of the housing subsidy should not exceed the amount of money in the poverty threshold that is presumed to be housing expenses. To address this, one final change was made to the estimated subsidies before poverty rates were computed: subsidies were capped at 44.3 percent of the relevant poverty threshold, the budget share of housing, using the NAS panel results.

At the same time, the various methods were similar at defining the effect of including housing subsidies as a resource in the measurement of poverty. All four new methods based on the AHS had poverty rates of 12.1 percent. As expected, this is lower than the official poverty rate for 1998, 12.7 percent. Due to its higher subsidy value estimates, the FMR method did result in a lower poverty rate of 11.8 percent. The characteristics of the families defined to be in poverty were remarkably similar regardless of the method that produced the value of housing subsidies used in the poverty measure.

Furthermore, the methods do not appear to have a differential impact on the various segments of the population. Stern (2000) reports poverty rates for selected groups of people under the alternative valuation methods. These rates show that certain portions of the population, such as seniors and people living in families with a female householder with no spouse present, will experience slightly lower poverty rates under the modified poverty definition. These differences are consistent with the overall lower poverty rates under the alternative definition.

2001 Working Paper: An Extension of the 2000 Working Paper¹¹

Although using an FMR approach in the manner described above has intuitive appeal and statistical support, it is not without controversy. HUD has maintained that these rents do not attempt to estimate a market value for subsidized housing units and therefore are not optimal for that purpose.¹² Consequently, the Census Bureau continued exploring alternatives.

After presentation of the 2000 working paper at the Joint Statistical Meetings in Indianapolis and a series of related presentations at the Census Bureau, the study of a statistical match between the

¹⁰ Note that at this point in the paper, the unit of analysis becomes people or families in the poverty universe. Given that subsidies are scaled to family size, this will result in the loss of some of the subsidy value. As an example, a household includes a family of 4 plus an unrelated individual under the age of 15. The family of 4 is assigned four-fifths of the value of the housing subsidy. The unrelated individual is assigned one-fifth of the housing subsidy. In the calculation of the distribution of household-level subsidies in Table 3, this sample household contributed one subsidy, which is the sum of the two family-unit level subsidies. However, the poverty universe does not include unrelated individuals under 15 years old. Therefore, the distribution of subsidies in the poverty universe will include only the scaled subsidy from the family of four in the sample household.

¹¹ Stern, Sharon M. "Valuing Housing Subsidies in a New Measure of Poverty: A Statistical Match of the American Housing Survey to the Current Population Survey," Poverty Measurement Working Paper, U.S. Census Bureau, 2001a.

¹² In *Experimental Poverty Measures: 1999*, Short describes several specific reasons HUD analysts advised the Census Bureau not to use FMRs to adjust poverty thresholds. Many of those are relevant to the use of FMRs to value housing subsidies.

AHS and CPS was expanded and differences between the two surveys more thoroughly explored. The result was a companion paper, “Valuing Housing Subsidies in a New Measure of Poverty: A Statistical Match of the American Housing Survey to the Current Population Survey”.

Model-based methods also have several problems that needed additional investigation. For example, the subsidy models estimated using the AHS data have low statistical explanatory power, therefore applying the estimated coefficients to the CPS raises questions about the predicted values. In addition, some of the models previously used attempted to use size of city and region to identify the geographic differences in prices. That method, proposed as a way to include location without violating confidentiality, assumed that size of place is what makes cities similar as housing markets. Finally, the inclusion of income in the model raises a concern, because income is measured differently in the two surveys.

The paper included a review of systematic differences in measurement of income between the AHS and the CPS. That analysis presented a chart demonstrating that, due to sampling and measuring differences, the distribution of income is different. Specifically, the CPS shows lower income levels than the AHS. As a result, any model based on AHS income and applied to CPS to predict rents will have a downward bias.

The companion paper evaluated a new technique for valuing housing subsidies which addressed several of the shortcomings with the approach used in the Stern 2000 model. Referred to as Stern 2001a, the method differs from the previous one in several key ways.

- First, the set of uniquely identified Metropolitan Statistical Areas in the first stage is limited to 50, a group which should be stable over time, allowing for repeatability of the proposed procedure.
- Second, the statistical match is a “predicted mean match”, which eliminates several problems, including the problem of identifying which match is the best out of a set of replicates.
- Third, the statistical match is designed to find the market value of rent for households in the CPS. This rent can then be used to value the subsidy. In previous work, the value of the subsidy was put on the household record in the CPS.

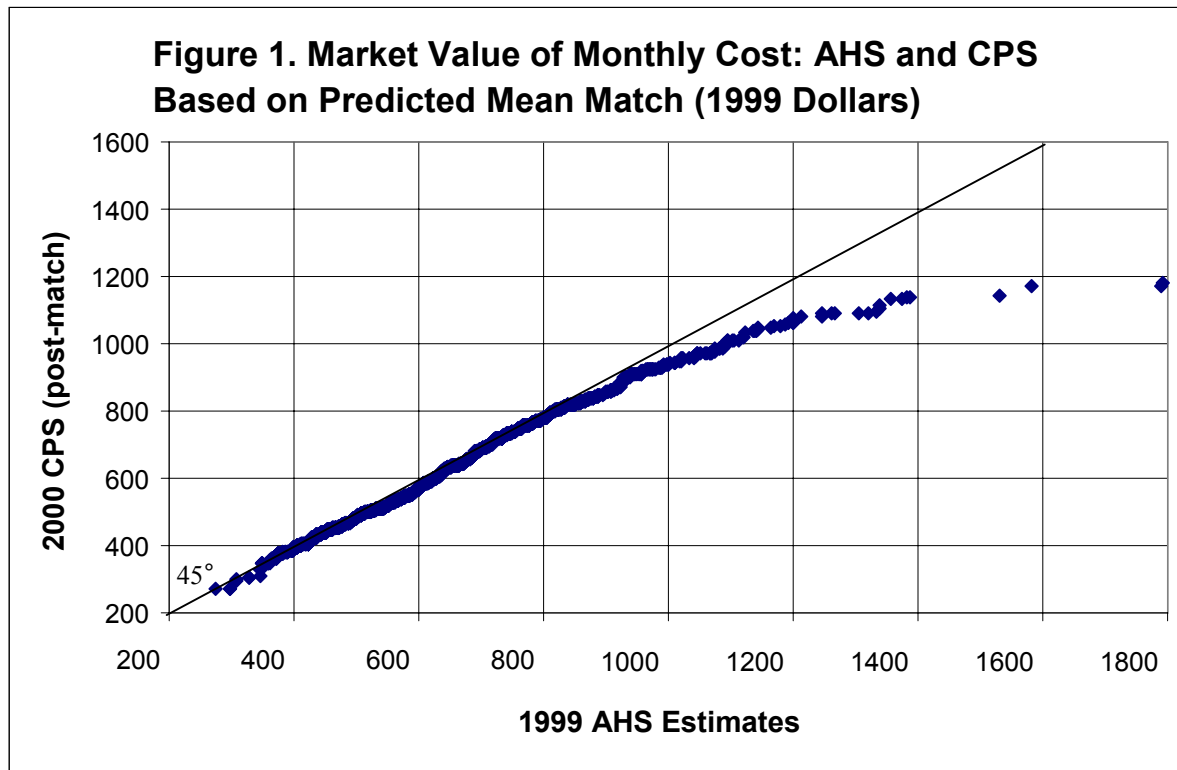
The major divergence from previous work is in the second and third elements above. The new procedure does not estimate a subsidy amount for an AHS household. Given the differences between how income is measured in these surveys, any model or statistical match that uses them might be suspect. And at the same time, the correlation between subsidy amount and income is too high to be ignored in these methods. The resulting approach is one in which market rents are the result of a statistical match between the two surveys. After rents are assigned, the estimated subsidy on the CPS is calculated as the difference between market rent and 30 percent of CPS household income.

Unlike the statistical matching used in the Stern 2000 model, the predicted mean match method does not involve a cohort variable or a distance function. In the first stage, a regression model estimates coefficients in the relationship between the relevant shared characteristics and the

market rent on the AHS.¹³ Once market rents are modeled in the AHS, the model is used to predict the market value of subsidized rental units in both the AHS and CPS. In the second stage, the predicted values are statistically matched.

Results

In order to evaluate the predicted mean match between the AHS and the CPS, Figure 1 shows the distribution of the market value for rent in the CPS versus the market value of rent on the AHS.



Notes: AHS is American Housing Survey. CPS is Current Population Survey.

Source: Stern (2001a)

The graph suggests that the predicted mean statistical match meets at least one of its objectives: in the lower price range, it does a reasonable job replicating the distribution of the market value of monthly costs. The paper presents a table reporting several points on the distribution of market rents on the two surveys, which supports the findings demonstrated in Figure 1.

Table 4 compares the subsidies that could be calculated on the AHS with those derived from the market rents on the CPS resulting from the predicted mean statistical match. The CPS subsidies are slightly higher but result in lower aggregate subsidy value. Several conflicting elements

¹³ The independent variables in this model of market rent included the following: the number of people in the household, The percent who were children, whether the householder was 65 years or over, whether the householder was married, whether the householder was male, and a small set of geographic indicators based on general rental prices in the area based on FMRs.

contribute to this difference. First, the AHS subsidy estimates were based on the market rent less the reported rent paid. Stern (2001a) had earlier shown that the reported rent paid is often lower than 30 percent of household income, the proxy used on the CPS. The second factor is that the market rents are generally lower in the CPS, as demonstrated in Figure 1.

Table 4. Statistics on Household Level Subsidies in the American Housing Survey (AHS) and the Current Population Survey (CPS): 1999 (Dollars)

Source	Monthly Subsidy Value						Annual Subsidy (Billions)
	Average	Minimum	25 th Percentile	Median	75 th Percentile	Maximum	
AHS	240	0	0	219	411	1304	16.8
CPS	303	0	155	283	431	1544	16.2

Notes: For an explanation of the methods, see text.

Source: Stern (2001a).

Like the earlier working papers, Stern (2001a) reports an evaluation of subsidies on the CPS across several methods using the family as the unit of analysis and capping the two newly estimated subsidy values at 44.3 percent of the poverty threshold.

Table 5 shows that the FMR method estimates larger subsidy values than the other two methods. Because the proxy for amount paid by the renter, 30 percent of income, is the same in both methods, the main reason subsidies are higher using the FMR method is that the rental amounts assigned using the FMR method are higher. For example, the average monthly cost on the CPS using a predicted mean match is \$588. Using the FMR method, the average monthly cost is \$622.

Table 5. Statistics on Family Level Subsidies in the Current Population Survey: 1999 (Dollars)

Method	Monthly Subsidy Value						Annual Subsidy (Billions)
	Average	Minimum	25 th Percentile	Median	75 th Percentile	Maximum	
Current Method	175	66	109	159	240	397	10.0
Unrestricted subsidy values							
Fair Market Rent Method	336	0	149	306	484	1728	19.2
Predicted Mean Match	283	0	118	263	414	1330	16.2
Subsidy values capped							
Fair Market Rent Method	280	0	149	295	392	1189	16.0
Predicted Mean Match	247	0	117	263	320	923	14.1

Notes: For an explanation of the methods, see text.

Source: Stern (2001a).

This table also shows the effect of putting a limit on the maximum subsidy that will be added to resources. In this case the value of the housing subsidy will not exceed the amount of money in the poverty threshold that is presumed to be housing expenses. While the cap is binding in a share of cases under both methods, the net effect is to bring the distribution of subsidies under the two methods closer together.

By definition, calculating poverty when subsidy values are added to income and no other changes are made will result in poverty rates lower than the official rate, 11.8 percent in 1999. The methods examined in Stern (2001a) yield different estimates of poverty. Using the current method of subsidy valuation results in a poverty rate of 11.4 percent, higher than the FMR approach (10.9 percent) and the predicted mean match (11.1 percent).

The different methods did not appear to have a differential impact on certain population subgroups of interest. Nor did the method used to value subsidies seem to have an impact on the characteristics of people with income below the poverty level. For example, under the current definition of poverty, 37.5 percent of the people in poverty are children. With the value of subsidies added to the resources of the family, the percent varied between 37.6 percent and 38.1 percent.

The poverty rates for the subsidized population were impacted by these three different methods for calculating the value of the subsidy. The methods that estimate higher rents will result in higher subsidy values and lower poverty rates. For example, the poverty rate for those receiving subsidies varies from 60.7 percent under the official definition to 39.2 percent where the FMR method subsidy is added to resources. In addition, the impact is not the same across subgroups. The poverty rate among people aged 65 and over is lower using the predicted mean match method than any of the other methods. In contrast, the overall poverty rate, the rate for females, and the rate for people living in the South are lowest using the FMR method.

IV. Research by the Census Bureau: Valuing Housing Subsidies in the Survey of Income and Program Participation

Since the NAS panel recommended that the Census Bureau use the SIPP for the official measure of poverty, the Census Bureau also engaged in research investigating how to apply the improved methods of valuing housing subsidies to that survey. The panel noted that SIPP is a preferred data source for valuing non-cash benefits because additional information is collected. Among other things, SIPP collects data on housing costs for renters, which provides a better basis for imputing a market value for the housing subsidy than CPS.

1997 Working Paper¹⁴

The 1997 working paper by Shea, Naifeh, and Short examined methods of valuing housing subsidies in the 1991 panel of SIPP. The paper focused first on how to adapt the same style of measure currently used on the CPS and then explored alternatives. Ultimately the research compared three main methods with two variations. The methods are almost the same as those used in the 1997 working paper by Naifeh and Eller using the CPS. Both papers start with the current method as a baseline. Both present two variations of a regression model using the 1993 AHS, where the major difference between the two is the number of geographic areas included, and both compare the results to an FMR approach.¹⁵ The one difference is the first alternative to the current approach. The Naifeh and Eller paper presented the results of applying the current method exactly to the 1993 AHS data. The Shea et al. paper presents a different alternative, where the 1985 AHS modeled subsidies are still used but the subsidy value table uses their new proposed bedroom imputation.

Results

As in other research, the authors compared average and aggregate subsidy amounts as a way to choose the best among the methods. They further examined the impact on a measure of poverty.

Using the SIPP 1991 panel, Shea et al. estimated 14 million people lived in households that reported receiving housing subsidies for one or more months in calendar year 1991. For January of 1991 alone, the number was 5 million. This estimate is slightly higher than the number of households receiving assistance as reported by the Congressional Budget Office, 4.6 million.

Table 6 presents the aggregate expenditures on housing subsidies by estimation method. HUD had an aggregate expenditure of \$14.2 billion in 1991. Applying the current Census Bureau method – including the current imputation for the number of bedrooms – found an aggregate annual expenditure of \$9.8 billion. Applying the same method with a new imputation of the number of bedrooms resulted in an estimate of \$8.7 million. Both of these are lower than the alternative methods. The two new model-based approaches, labeled Shea et al. in the table, yield

¹⁴ Shea, Martina, Mary Naifeh, and Kathleen Short, "Valuing Housing Subsidies In A Measure of Poverty In The Survey of Income and Program Participation," Poverty Measurement Working Paper, U.S. Census Bureau, 1997.

¹⁵ Although SIPP households do report a rent paid, Shea et al. used the 30 percent of income as a proxy for rent paid in the FMR method.

an estimate of aggregate expenditures of \$15.0 and \$15.4 billion, depending on the number of geographic areas identified in the model. The FMR method estimates resulted in annual total of \$15.1 billion.

Shea et al. then presents the average subsidies to people, slightly different from other research approaches, which do not exactly follow the same pattern as the aggregate subsidies. Looking at average subsidy per person, Shea et al. find that the FMR method results in an average monthly subsidy of value of \$133, higher than both of the new model-based estimates, \$114 for the model with 21 geographic areas and \$111 for the model with 52 geographic areas. The current method and its variation in bedroom imputation result in lower average per person subsidies, \$72 and \$63, respectively.

Table 6. Aggregate Value of Housing Subsidies: 1991 (Billions of Dollars)

Source and method	Value
Department of Housing and Urban Development outlays for rental assistance	14.2
Survey of Income and Program Participation Estimates	
Current Method – 1985 AHS estimates updated with CPI	9.8
Current Method – model with improved bedroom imputation	8.7
Shea et al. Method – 21 geographic areas identified	15.4
Shea et al. Method – 52 geographic areas identified	15.0
Fair Market Rent Method	15.1

Notes: For an explanation of the methods, see text.
AHS is the American Housing Survey.
CPI is the Consumer Price Index.

Source: Shea, Naifeh, and Short (1997).

With respect to the effect of adding subsidy values to income in a measure of poverty, Shea et al. summarize their findings as follows:

Adding housing subsidies to family income to determine poverty status affects subgroups differentially. Moreover, the impact of the FMR method relative to the other methods differs by subgroup. For example, the elderly population as measured in the SIPP for 1991 has a poverty rate of 9 percent. Including housing subsidies as income reduces the poverty rate to 7.1 percent, a 21 percent decline. But this difference is similar regardless of the method used. On the other hand, the poverty rate for children was 19.6 percent, and valuing housing subsidies using the current method only reduces the poverty rate by 0.4 percentage points, a 2 percent reduction. Using FMRs to value subsidies, however, has a larger impact on the poverty rate for children. This method reduces the child poverty rate by one percentage point, a 5 percent reduction. Similar differential effects are noticeable for other groups as well. The FMR method causes a reduction in poverty similar to the other methods in the South and Midwest, but a relatively larger reduction in the West and Northeast.

This paper shows that applying similar estimation techniques to the SIPP and the CPS yields similar results. While the analysis presented for SIPP used 1991 data and that for the CPS used

1993 data, comparing across the two papers reveals familiar patterns across techniques. However, important differences across the surveys exist. The SIPP accounts for less than full-year receipt of housing subsidies by identifying a household's status in each month and assigning a monthly subsidy only to the months covered, while the CPS assesses receipt of housing assistance as of the interview date and assumes it for the entire previous calendar year. Consequently, the SIPP data produce higher estimates of people receiving subsidies than data from the CPS.

2001 Working Paper¹⁶

In the same way that the 1997 research using SIPP by Shea et al. used methods similar to the concurrent work by Naifeh and Eller using CPS, this working paper (Stern 2001b) uses similar methods to those described in the 2001 paper using the CPS (Stern 2001a).

The general purpose of the second 2001 paper was to evaluate the statistical matching technique for valuing housing subsidies for people in the SIPP data. The paper compared subsidy values and poverty rates that result from a predicted mean statistical match between the AHS and SIPP to ones derived from an FMR approach. Several differences between this application of the statistical match and the one used in previous work matching the AHS to CPS were necessary due to fundamental distinctions between CPS and SIPP. For example, SIPP has more data available for assessing the similarity of households between SIPP and AHS. Like other papers, Stern 2001b explored the impact of this new procedure on the distribution of the monetary value of subsidies and on the final poverty distribution, focusing specifically on a practical, repeatable procedure that could be incorporated easily into timely poverty statistics.

Specific Accommodations for SIPP

SIPP is administered every 4 months, but because the questions ask about each individual month, information about each person is allowed to vary from month to month.¹⁷ This variability on family and household structure and demographic and economic characteristics results in a special set of problems when attempting to report an annual poverty rate. Since poverty is based on the family unit, which is the family unit for which poverty will be determined? Would the Census Bureau use the family unit as defined at the beginning of the reference period? If so, then what happens as the family expands or contracts over the course of the period? Whose incomes would be added to family income? This short section describes some of these issues and the solutions used for this analysis.

Since household composition changes over the course of the year, the first step in preparing SIPP data to be statistically matched was to identify any person who was a householder in a subsidized household at any time during the year. Each of these people represents a household for the purpose of the statistical match. Furthermore, the household characteristics used in the match reflect the household in which these householders lived in the final month in which they reported

¹⁶ Stern, Sharon M. "Valuing Housing Subsidies in a New Measure of Poverty: Strategies for Using the Survey of Income and Program Participation," Poverty Measurement Working Paper, U.S. Census Bureau, 2001b.

¹⁷ This analysis used a preliminary 1996 panel longitudinal file for annualized 1996 estimates of housing subsidy values and poverty status. As such, some additional caveats are necessary. At the time the Stern paper was prepared, the SIPP file weights were not final and some data were still missing.

receiving a housing subsidy. For example, if person A was a householder all year, but the household received a subsidy only from April to November, then the household characteristics in November are the ones used to represent the household in the statistical match. The logic of this choice is that it is the most recent information. However, it may be that changes to the household composition are exactly what caused the change in receipt status.

SIPP also asks subsidized renters how much rent they paid. This information, which is not available in CPS, can be used to assess the value of the subsidy. The two main methods used in this paper use a proxy for the market value of the unit, called market rent in the predicted mean match and FMR in the alternative method. Both of these require a subtraction of rent paid so the surplus can be used as the value of the subsidy. Using SIPP data allows the option of using a reported rent paid rather than the proxy, 30 percent of income, based generally on the rules for a generic housing program. Comparisons of reported rent and the proxy using this SIPP data show that using 30 percent of income consistently overestimates the amount paid for rent. This result is expected given the use of a general rule. The actual rules for housing subsidy programs are quite complicated, often involving adjustments to income before a specific percentage is applied, and they vary by housing authority.

Results

As in the predicted mean match between CPS and AHS, the match in Stern 2001b resulted in a distribution of market rent in SIPP that paralleled the distribution in AHS. Table 7 reports some summary statistics on the distributions of market rent based on the AHS and the SIPP. The SIPP rents shown are the monthly amounts that were assigned by the predicted mean match; each rent is represented once for each household.

Table 7. Statistics on Monthly Market Rent: American Housing Survey (AHS) and Survey of Income and Program Participation (SIPP) (Dollars)

Source	Average	Min-imum	25 th Per-centile	Median	75 th Per-centile	Max-imum
AHS	613	274	476	587	718	2004
SIPP	601	274	468	565	697	2004

Notes: For an explanation of the methods, see text.

Source: Stern (2001b).

As was the case in other research, Stern (2001b) reports that the FMR method estimates larger subsidy values for families than the statistical match method. In addition, it shows that using the reported rent paid – which is generally lower than 30 percent of income – creates a much larger overall estimate of the subsidy value using either the predicted mean match or the FMR method. Specifically, Stern 2001b found that aggregate subsidies using the FMR approach ranged from \$25.4 billion (using reported rent paid) to \$20.5 billion (using 30 percent of income as a proxy for rent). Using the predicted mean match, estimated subsidy values were \$21.9 billion using the reported rent paid and \$16.7 billion using 30 percent of income as a proxy.

Table 8 demonstrates how these different methods can affect the poverty rate when the rate is calculated using a single modification to the official definition, the addition of subsidies to resources. Notice first that the poverty rate in SIPP with no modifications is lower than the official CPS poverty rate, primarily due to differences in collection mode. SIPP interviews the same respondents every four months and asks about income earned over that same period. On the other hand, CPS asks respondents about their income for the entire previous calendar year in February, March, or April.¹⁸ Research has shown that while both CPS and SIPP respondents underreport income, levels of underreporting are generally higher in the CPS than in the SIPP.

Table 8. Effect of Housing Subsidies on the Number and Percent of People in Poverty: 1996

Source and method	Number (thousands)	Percent
Official Current Population Survey Poverty	36,529	13.7
SIPP Poverty using the official definition and money income	24,004	11.8
With subsidy value added to income		
Predicted Mean Match Rent Less 30% of Income	21,757	10.7
Predicted Mean Match Rent Less Reported Rent Paid	21,383	10.5
Fair Market Rent Less 30% of Income	21,029	10.4
Fair Market Rent Less Reported Rent Paid	20,682	10.2

Notes: For an explanation of the methods, see text.
SIPP is the Survey of Income and Program Participation.

Source: Stern (2001b).

Further, like other research reviewed in this paper, the Stern (2001b) research using SIPP also shows that, because FMRs produce consistently higher estimates of rent than the predicted mean match, the subsidies generated are higher and the resulting poverty rates lower than those calculated using the rent from a predicted mean statistical match. Furthermore, since 30 percent of income is reliably higher than reported rent paid, all the estimates using 30 percent of income as a proxy for rent paid result in lower subsidies and higher poverty rates.

Because SIPP estimates that just under 5 percent of people lived in subsidized households for at least one month in 1996, the effect on the poverty rate of these different methods is rather small. However, the poverty rate among those people living in subsidized housing is affected by which

¹⁸ The CPS ASEC interviews roughly 78,000 households about income in the previous calendar year and current demographic characteristics, carried out over a 3-month period (February-April) by telephone and personal visit. Interviewers return to the same unit for 4 months, skip 8 months, and then return for 4 additional months. Households moving out of their units are therefore replaced by households moving in. One-eighth of the sample is new each month. Income data collection focuses on up to 50 sources of income (including many non-cash benefits) and up to 27 individual income values.

The SIPP consists of 9 or 12 interviews spaced 4 months apart over a 3- or 4-year period and asks a set of “core” questions about the previous 4 months by telephone and personal visit. At current response rates, the roughly 31,700 completed wave 1 interviews in the 2001 panel yielded roughly 25,500 completed wave 9 interviews. The 2004 panel of the SIPP is larger as it is supplemented in selected states by funds from the 1996 welfare reform act in order to improve estimates for low-income families in those states. Interviewers return to the same *household* (not housing unit) nine or twelve times at 4-month intervals (thus for 36 or 48 months), and attempt to follow each *individual* interviewed in wave 1, even if they move. Income data collection focuses on up to 81 sources of income and up to 73 individual income values.

method is chosen. The poverty rate in SIPP for people in subsidized housing with no adjustment for non-cash resources is 60.0 percent. When income is increased by the value of subsidy derived using the statistically matched market rent and the reported rent paid, the alternative poverty rate is 32.4 percent. Furthermore, when income is increased by the value of subsidy calculated using the FMR and the reported rent paid, the alternative poverty rate is 24.9 percent.

V. Census Bureau Reports on Experimental Poverty Measures

The purpose of the 1999 and 2001 Census Bureau reports was to provide information on the implications of implementing the NAS panel's recommendations. To that end, the reports present estimates of experimental poverty measures showing how the poverty rate derived according to the recommendations would have differed from the official measure. The reports attempted to isolate the effect of following one or two suggestions in addition to showing the effect of implementing a large set of recommendations at the same time. Given the array of research efforts on various aspects of the multiple recommendations, these reports present selected variations as illustrations of the research on given topics.

With regard to housing subsidy valuation, both reports discuss more than one approach. While some approaches differ – as described below – based on the availability of research, both reports provide estimates based on variations of the FMR approach. Specifically, in the research described earlier in this report, the FMRs were applied directly to units in the CPS or SIPP based on the detailed geographic identifiers. Since the FMRs are available for metropolitan areas and non-metropolitan area counties, the geographic identifiers on the internal files (MSA and county codes) did allow this application of FMRs – the closest link between a housing market and a unit in sample. Unfortunately, releasing these values on the data file is not possible because of the Census Bureau's legal and ethical requirements to protect respondent confidentiality.¹⁹

The 1999 Report²⁰

In the detailed tables and the text of the first report, experimental poverty rates that include the value of housing subsidies use the current method as included in the CPS processing – the estimates of subsidies using 1985 AHS data as a base and updating with the CPI. Short et al. show that, when the value of housing subsidies are added to income in the 1998 CPS, the poverty rate for 1997 changes from 13.3 percent to 12.8 percent.²¹ The 1999 experimental poverty report discusses two improvements to valuing subsidies in Appendix C: the effect of using FMRs and of using the present Census Bureau approach updated with the 1993 AHS as the base.

The variation of the FMR method involved use of state averages rather than specifically identified MSAs or counties. Since FMRs vary by the number of bedrooms in a unit, these reports use a population-weighted average of FMRs by state and number of bedrooms in the unit. Using a similar procedure to the ones described earlier, this report subtracts 30 percent of

¹⁹ The U.S. Census Bureau and the Bureau of Labor Statistics jointly sponsor the CPS under the authorities of Title 13, United States Code, Section 182, and Title 29, United States Code, Sections 1-9. This law requires the Census Bureau to keep all information about respondents strictly confidential, using the information only for statistical purposes.

²⁰ Short, Kathleen, Thesia Garner, David Johnson, and Patricia Doyle, *Experimental Poverty Measures: 1990 to 1997*, U.S. Census Bureau, Current Population Reports, Consumer Income, P60-205, U.S. Government Printing Office, Washington, D.C. 1999.

²¹ These comparisons between the official poverty rate and the simulated poverty represent actual differences as they are essentially the result of a sensitivity analysis. Analysis of this type is independent of sampling variability issues.

household gross income from the assigned average FMR to get the value of the housing subsidy.²²

The discussion of the alternative approaches concludes that the panel appears to be correct that the subsidy values should be updated with the most recent AHS data, as the CPI-Rent updates appear to leave subsidy values consistently lower than reported HUD expenditures.

The 2001 Report²³

Based on research subsequent to the 1999 report, the 2001 report used two new methods for valuing housing subsidies. In both approaches, the value of housing subsidies is limited to 44 percent of the family's poverty threshold, that proportion which is allocated to shelter costs.

First, the report used an FMR approach applied in a slightly different manner from that in the 1999 report. Rather than using state average FMRs for households, the new report used the average FMR by state and metropolitan area status. This method allows people in more rural areas to have a rent assigned that is different from that assigned to people living in cities. This approach still protects confidentiality but also allows for more geographic variation in rental prices. Using 2000 CPS to compute 1999 poverty rates, the FMR approach would yield a poverty rate of 14.4 percent compared with 15.0 percent using the experimental measure with no subsidy value included with resources.²⁴

Second, the report used a predicted mean statistical match between the 2000 CPS and the 1999 AHS. As in Stern (2001a), the AHS model of rents in the first stage includes only 50 geographic areas and the predicted mean match uses the composition of the household (number of people and percentage who are children), a few characteristics of the householder, and a small set of indicators of location. Since the estimated subsidies based on the statistical match are generally lower than those based on the FMR approach, it is not surprising that the poverty rate when model-based subsidies are added to income (14.6 percent) is higher than the alternative FMR approach but still lower than experimental poverty rate without a value of housing subsidy added to resources.

²² This report uses the household income excluding the income earned by people under the age of 18.

²³ Short, Kathleen, *Experimental Poverty Measures: 1999*, U.S. Census Bureau, Current Population Reports, Consumer Income, P60-216, U.S. Government Printing Office, Washington, DC, 2001.

²⁴ Rather than using the official measure as the main comparison, Short used an experimental measure with a three-parameter equivalence scale adjusting the thresholds. In the analysis of the two alternative housing subsidy valuation techniques, Short started with the experimental measure, made the one change (adding the value of housing subsidies to resources), and compared the newer version with the one before the change. For details on the experimental measure which uses a three-parameter equivalence scale, called the DES (Different Equivalence Scale) measure, see Short (2001), page 3.

VI. Summary

During the years following the 1995 NAS panel's report, the Census Bureau undertook research on several aspects of the methodology for valuing housing subsidies for both the CPS and the SIPP. These studies investigated several NAS panel recommendations and identified potential improvements. All of these approaches have some recognized limitations. In the long run, a theoretically sound, practical, and repeatable method for valuing housing subsidies in a new measure of poverty will depend on the information available and the balance between the strengths and weaknesses of the approach chosen.

Among the methods for using an AHS model to produce estimates and apply them to families in the CPS or SIPP, the predicted mean match has one particular benefit the other methods lack, that the matched rents on the CPS have a distribution that closely resembles that of the AHS. On the other hand, that method currently relies on using a simple rule of thumb such as 30 percent of income as the proxy for rent paid. Several studies have shown that reported rent paid by subsidized renters is generally less than 30 percent of income.

The AHS model-based estimates all use the household's characteristics (number of people, age of householder, etc.) to some extent as a proxy for housing characteristics (number of bedrooms, number of bathrooms, etc.), which are not available for CPS or SIPP. While the earlier methods (which carried subsidy amounts over from AHS to CPS) avoided the difficulty of using 30 percent of income as a proxy for rent, they had the same limitations in the model for applying subsidy value. Those methods relied on a count of bedrooms, which is unavailable on CPS and SIPP. Using an algorithm to determine the number of bedrooms a family is entitled to have in a subsidized unit under one particular housing program has severe limitations. First, for a variety of reasons, even when receiving a Section 8 housing subsidy, families are often not living in units with the number of bedrooms for which they are eligible under Section 8 rules. Second, the variety of state, local and other national housing support programs leaves this bedroom determination method vulnerable to misestimation. This problem is increasingly troubling in the face of constantly changing rules and the general shift in federal government policy to passing control to local authorities.²⁵

Despite HUD's recommendation that the Census Bureau avoid using FMRs for geographic adjustment of housing prices, the FMR alternative has advantages. It is repeatable, reliable, and available for small geographic areas. It was designed to capture the geographic variation in cost of rental units. Unfortunately, this method also has the two main shortcomings noted above: it relies on imputing the number of bedrooms and it requires the use of a proxy for rent paid.²⁶

While many of these alternative methods were designed to take maximum advantage of the data available, they could be improved if more information were available. For example, the predicted mean statistical match would certainly be theoretically (and quite possibly measurably) improved

²⁵ For example, the summary of the fiscal year 2005 budget for HUD posted on the web site, <http://www.whitehouse.gov/omb/budget/fy2005/hud.html>, explains some proposed changes to the Housing Choice Voucher Program as follows, "The Administration proposes to simplify the program and give more flexibility to PHAs to administer the program to better address local needs."

²⁶ If SIPP were used as the official source of poverty estimates, the FMR method could use the reported rent paid.

if some housing unit characteristics were available on the CPS and SIPP. Characteristics of the unit are a key factor in determining the market value.

Finally, although this review did not specifically address it, the issue of geographic adjustments goes beyond the value of housing subsidies. The NAS panel included a recommendation that the Census Bureau adjust the thresholds to reflect varying price levels across the country for all consumption items, not just housing.

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