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Working Paper 510
September 2018

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September 25, 2018

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JEL Codes:
D12 Consumer Economics: Empirical Analysis
I3 Welfare and Poverty

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Abstract

Guidelines to produce a new supplementary poverty measure for the U.S. were released to the public in early 2010 and were presented as *Observations from the Interagency Technical Working Group on Developing a Supplemental Poverty Measure* (SPM). Since that time, research has been ongoing in the Bureau of Labor Statistics (BLS) and Census Bureau to produce and improve upon the initial measure. SPM statistics, released by the U.S. Census Bureau since 2011, are based on resources that account for federal in-kind (noncash) benefits for food, rent, and utilities. However, the SPM thresholds to which these resources are compared are primarily based on out-of-pocket spending on food, clothing, shelter, and utilities (FCSU). A guideline in the 2010 document was that thresholds and resources would be defined consistently. By accounting for in-kind benefits in thresholds, a consistent SPM results. Census Bureau Current Population Survey Annual Social and Economic Supplement data are the basis of SPM resources while the BLS Consumer Expenditure Survey Interview data are the basis of the thresholds. This research has two goals: (1) to describe the methods currently used to produce the SPM thresholds, showing thresholds for 2005-2015; and (2) to present ongoing research designed to improve SPM thresholds by including the value of in-kind benefits along with FCSU expenditures. These latter thresholds are produced for 2014 only. In-kind benefit based SPM thresholds are statistically higher than SPM thresholds that are based on expenditures only for all three housing tenure groups: owners with mortgages, renters, and owners without mortgages.

Key Words: U.S. Consumer Expenditure Survey, U.S. Current Population Survey Annual Social and Economic Supplement (CPS ASEC) Poverty Measurement, Multiple Imputation, In-kind Federal Government Benefits

I. Introduction

Identifying the "poor" has been a challenge since at least the time of Adam Smith, with poverty referring to both one's ability to meet basic needs and also to social exclusion. Thus, regardless of mechanics of the measure, poverty is a social concept.[1] In the U.S., poverty has been defined in terms of economic deprivation with a comparison of resources to meet particular basic needs of people living in the U.S. The earliest official measure of poverty in the U.S. was based the income available to meet a family's basic needs with basic needs defined as a multiple of food spending at one point in time (the earlier 1960's with an update for changes in prices only). For official poverty, in-kind benefits are ignored as are taxes, and medical care and work related expenses. Thus, taking account of tax and transfer policies, such as the food stamp program and the earned income tax credit (EITC), the measure can show the effects of these policies on various targeted subgroups, for example, families with children. The current official measure, which does not explicitly take account of these benefits, yields poverty statistics that are unchanged regardless of many of such policy changes. In response to this and other criticisms,[2] the Panel on Poverty and Family Assistance was convened and released its report titled *Measuring Poverty: A New Approach* in the spring of 1995, (Citro and Michael, 1995). The Panel recommended that basic needs be identified as a share of spending on food, clothing, shelter, and utilities (plus a little more for personal care and other needs) and that resources be defined as those available to meet those spending needs.

Following the Panel's report, much research was generated within and outside the federal government arena. By the winter of 2010, a group of experts were identified and began working together to evaluate and build on the Panel's report and subsequent research. This group, known as the Interagency Technical Working Group (ITWG), produced guidelines for a Supplemental Poverty Measure (SPM). Their report, *Observations from the Interagency Technical Working Group on Developing a Supplemental Poverty Measure* (SPM, was released in March of that year. The ITWG developed a set of initial starting points to permit the U.S. Census Bureau, in cooperation with the Bureau of Labor Statistics (BLS), to produce the SPM statistics that would be released along with the official measure each year. The ITWG stated that the official poverty measure, as defined in Office of Management and Budget (OMB) Statistical Policy Directive No. 14, would not be replaced by the SPM. They noted that the official measure is sometimes identified in legislation regarding program eligibility and funding distribution, while the SPM will not be used in this way. The Supplemental Poverty Measure (SPM) is designed to account for taxes and transfers aimed at alleviating the hardship of people living in low-income families, households, and consumer units. The SPM is designed to provide information on aggregate levels of economic need at a national level or within large subpopulations or areas and, as such, the SPM will be an additional macroeconomic statistic providing further understanding of economic conditions and trends. The ITWG report describes a poverty measure that is based largely on the NAS Panel's recommendations, with deviations reflecting more recent research and suggestions from the ITWG. In developing the guidelines, priority was placed on consistency between threshold and resource definitions, data availability, simplicity in estimation, stability of the measure over time, and ease in explaining the methodology. The members of the group considered the SPM a work in progress with the expectation that there would be improvements to it

[1] For discussions regarding the measurement of poverty generally, and not specific to the U.S., see for example, Atkinson (1987), Atkinson and Bourguignon (2001), Chen and Ravallion (2012), Deaton (2005). Eurostat (2005), Ferreira and Ravallion (2009), Foster (1998), Foster et al. (1984), Jenkins and van Kerm (2014), Nolan (2007),
Ravallion (2011), and Sen (1976, 1983). Also see two books by Jenkins (2011) and Jenkins and Micklewright (2007).

[2] See Fisher 1992 for details on the official measure and Ruggles 1990 for an earlier critique and recommendations for revising poverty measurement for the U.S.

over time. The measure would improve "as new data, new methods, and further research become available."

Since 2011, the Bureau of Labor Statistics (BLS) and Census Bureau have been working together to produce SPM thresholds, resources, and poverty statistics.[3] Resources account for money income, income taxes, work-related expenditures, and medical care spending. [4] Since the SPM was first produced, the value of in-kind benefits have been included in resources, but not thresholds. Included in resources are benefits such as Supplemental Nutrition and Assistance Program (SNAP), National School Lunch Program (NSLP), Women, Infants, and Children Program (WIC), rent subsidies, and energy assistance[5] (e.g., Short 2015; Renwick 2015; Renwick and Fox 2016). The base data set for resources is the Census Bureau Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) data. SPM thresholds are based on out-of-pocket spending for food, clothing, shelter, utilities (FCSU), and other basic needs represented by a multiplier applied to FCSU expenditures. The source of the spending data for the thresholds is the U.S. Consumer Expenditure Interview Survey (CE). [6] Separate thresholds are produced for owners with mortgages, owners without mortgages, and renters. Unlike SPM resources, previously published thresholds, those used by the Census Bureau for poverty statistics, do not account for the values of in-kind benefits for food, rents, and energy, with the exception of Supplemental Nutrition Assistance Program (SNAP). SNAP benefits are automatically included as food expenditures. The CE collects limited or no data on the in-kind benefit programs. Thus an inconsistency in thresholds and resources results. This inconsistency can result in an overestimate of the economic well-being of people in the U.S. when defined in terms of the SPM, and thus an underestimate of SPM poverty.

Work on the SPM, conducted at the BLS and Census Bureau, has been conducted as "research" since the ITWG guidelines were published. This means improvements could be made fairly easily in our production of the thresholds and resources. However, with the U.S. President's Budget for fiscal year 2014, the Census Bureau received funding to produce SPM poverty statistics. That was the first year with such funding had become available. Since then changes in the SPM resource measure and presentation of the related poverty statistics have undergone greater scrutiny than they had in the past. Funding for the BLS to produce SPM thresholds has not been forthcoming, although requests for funding have been included in previous years' budget plans. Thus, the threshold work presented in this paper, continues as research under the auspices of the Division of Price and Index Number Research within the BLS for the foreseeable future.

The purposes of this paper are two. One, describe the methods currently used to produce the SPM thresholds. And two, present ongoing research designed to improve SPM thresholds by including the value accounting in-kind benefits along with FCSU expenditures, focusing on thresholds for 2014. In-kind benefits for thresholds are produced through the use of logit and regression based methods. Imputations are produced for consumer units in the CE survey for four of the federal in-kind benefit

[3] See http://www.census.gov/hhes/povmeas/methodology/supplemental/index.html and http://www.bls.gov/pir/spmhome.htm for ongoing SPM research.
[4] For resources, see http://www.census.gov/hhes/povmeas/methodology/supplemental/index.html, and for thresholds, see http://www.bls.gov/pir/spmhome.htm .
[5] In some states, consumers receive checks to help pay for heating and cooling, while in others the benefit is paid directly to the utility company. When checks are received by consumer units, depending on the state, they may be able to use the value of these to pay for expenses other than heating and cooling or they may be restricted to paying for heating and cooling only.
[6] The CE is composed of two parts: the Interview and the Diary. The Interview is used to collected information over a longer period of time than is the Diary. Also, detailed clothing, shelter and utilities expenditures data are available in the Interview. Food expenditures are most extensive in the Diary; however, since it is necessary to produce the SPM thresholds using consumer unit specific data, global food expenditures collected in the Interview were used. In the future, the Division of Consumer Expenditure Surveys will be conducting research on how to combine data from the Diary and Interview to produce a better estimate of food expenditures. See http://www.bls.gov/cex/ for a detailed description of the CE Diary and Interview survey instruments.

programs that are represented in SPM resources: National School Lunch Program (NSLP), Women, Infants, and Children Program (WIC), and Low Income Housing Energy Assistance Program (LIHEAP), and rental housing subsidies.

The remainder of this paper is organized as follows. Section II is a summary of the ITWG guidelines for thresholds and resources, followed by a description of the data and methods used to produce the SPM thresholds currently being used by the Census Bureau for SPM poverty statistics. SPM thresholds for 2005 to 2015 are presented. Section III presents an overview of the data and methods used to produce SPM thresholds that include values for in-kind federal benefits. Included are descriptions of the in-kind benefit programs and data used to produce the imputations. Section IV includes a summary of the imputations to the U.S. population in terms of consumer unit participation in the programs, aggregate benefit levels, and average annual benefit dollar values per consumer unit. Section V focuses on SPM thresholds that account for the imputed in-kind benefits. Finally, the paper closes with a discussion of research issues and future research on SPM thresholds at the BLS.

The main conclusions from this study are the following and are based on thresholds for two adults and two children only:

Out-of-pocket spending based SPM thresholds for owners with mortgages and renters, but not for owners with mortgages, are higher than the single official poverty thresholds for 2014 and 2015.

Out-of-pocket spending based SPM thresholds for Owners with Mortgages and those for Renters are not statistically significantly different, but both are higher than those for Owners without Mortgages.

SPM thresholds with in-kind benefits are higher than those without benefits for all three housing tenure groups- Owners with Mortgages, Renters, and Owners without Mortgages- but with varying levels of significance.

II. Guidelines and Supplemental Poverty Measurement

A. Thresholds and Resources

As with other poverty measurement, the ITWG guidelines note that to determine poverty status using the SPM, a consumer unit or family's resources are compared to an appropriate threshold. If resources are below the threshold, all people in the family are counted as poor. Regarding thresholds, ITWG guidelines provide the following:

- The poverty threshold sets the annual expenditure amount below which a family is considered poor. Following the recommendations of the NAS panel, this should be established on the basis of expenditures on a set of commodities that all families must purchase: food, shelter, clothing and utilities (FCSU)...[and a multiplier to represent other goods and services considered necessary like non-work transportation, personal care, etc.]

- So far as possible with available data, the calculation of FCSU should include any in-kind benefits that are counted on the resource side for food, shelter, clothing, and utilities, this is necessary for consistency of the threshold and resource definitions.

The guidelines regarding resources include the following:

- The resource definition should indicate the resources the family has available to meet its food, shelter, clothing, and utilities needs, plus a little more.

- Following the recommendation of the NSAS report, family resources should be estimated as the sum of cash income, plus any Federal Government in-kind benefits that families can use to meet their food, clothing, shelter, and utility needs, minus taxes (or plus tax credits), minus work expenses, minus out-of-pocket expenditures for medical expenses.

The primary features of the SPM are presented in Chart 1. For comparison, characteristics of the U.S. official poverty measure and a relative measure are also presented. The relative poverty measure is comparable to those used internationally. For information on such international measures, see, for example, the second edition of the Canberra Group Handbook on Household Income Statistics[7].

B. SPM Poverty Thresholds Based on Expenditures Only

Threshold needs are defined as those for food, clothing, shelter and utilities plus a little bit more for personal care products and non-work related transportation.[8] For the currently published thresholds, and those used by the Census Bureau, out-of-pocket expenditures only are used. Since SNAP benefits are like cash, they are already included in out-of-pocket food expenditures. Expenditure data are from quarterly reports of consumer units participating in the U.S. Consumer Expenditure Survey. Five years of quarterly data are used. To produce thresholds for one year, for example, 2015, FCSU expenditures

[7] The handbook was prepared by an international Task Force operating under the auspices of the Conference of European Statisticians (CES) and sponsored by the United Nations Economic Commission for Europe (UNECE).

[8] FCSU refers to food, clothing, shelter, and utilities. Food expenditures are those for food at home and food away from home. Meals as pay are not counted nor are alcoholic beverages. Food expenditures are not expected to be exact but are collected through the use of global question and refer to "usual weekly" expenditures. Clothing expenditures include those for all the goods and services identified as "apparel" by the CE Division of the BLS. Apparel includes clothing for girls and boys aged 2 to 15, women and men 16 and over, and for children less than 2 years of age. This category also includes footwear and other apparel products and services such as jewelry, shoe repair, apparel laundry and dry cleaning, and clothing storage. Shelter includes expenses for owners and for renters. To create the shelter variable for the SPM thresholds calculation, I restricted shelter expenses to be those for the consumer unit's primary residence only. For renters, expenditures include those for rent paid, maintenance and repairs paid for by the renter, and tenants insurance. Rent as pay is not included although this rent since no information on this rent is collected in the CPS for resources. For owners, shelter expenses include those for property taxes and insurance, maintenance and repairs, and for those with mortgages, and mortgage interest and principal payments. As for renters, all expenditures are restricted to those for the CU's primary residence. Unlike for the expenses of renters and owners without mortgages, mortgage shelter expenditures reflect obligations, not necessarily what the consumer unit paid. The CE Survey collects information about the terms of the mortgage or mortgages on the primary residence. Then staff members at the BLS who work with the CE data calculate the obligated payments. If property taxes and insurance are included in the mortgage payment, these too are calculated by these staff members for the consumer unit. Utility expenditures are those for: energy including natural gas, electricity, fuel oil and other fuels; telephone services including land lines, cell service, and phone cards; and water and other public services such as trash and garbage collected, and septic tank cleaning. For owners, these are for the primary residence only. For renters, these are for any utilities for which they are obligated to pay with the exception of rented vacation homes. The amount recorded by the respondent is for what is charged or billed, not what the consumer unit necessarily pays. The exception regarding questioning for utilities is for telephone cards; consumer units are asked about the purchase price of pre-paid telephone and cellular cards and their spending for using public telephones.

from 2011 quarter two through 2016 quarter one are converted to 2015 U.S. dollars using the All Items CPI published by the BLS.

Because most federal benefit programs are designed to support children, expenditures for child based consumer units serve as the starting point for the thresholds. The ITWG guidelines noted that consumers units with at least two children would serve as the estimation sample but that their expenditures were be converted to those for two adults with two children to derive reference SPM thresholds. These reference thresholds would be produced at the BLS and then sent to the Census Bureau for further adjustment.

To convert expenditures from consumer units with two children to expenditures for exactly two adults with two children, an equivalence scale is used. The number of equivalent adults is determined by the number of adults and children in the household. For each consumer unit, FCSU expenditures are divided by the number of adult equivalent units. Each person in the consumer unit is assigned the adult equivalent value of FCSU expenditures for his or her consumer unit. Adult equivalent expenditures are then converted to those for two-adult two-child consumer units by applying the equivalence scale factor for this CU type to the single adult equivalent value for each consumer unit in the estimation sample.

As recommended in the ITWG guidelines, a three-parameter equivalence scale is used to adjust FCSU expenditures. The three-parameter scale allows for a different adjustment for single parents (Betson, 1996). This scale has been used in several BLS and Census Bureau studies (for example, see: Garner and Short 2010; Johnson et al., 1997; Renwick and Fox 2016; Short et al., 1999; Short 2001). The three-parameter scale is shown below.

$$\text{One and two adults: } scale = (adults)^{0.5} \quad (1a)$$

$$\text{Single parents: } scale = \left(adults + 0.8 * firstchild + 0.5 * otherchildren\right)^{0.7} \quad (1b)$$

$$\text{All other families: } scale = \left(adults + 0.5 * children\right)^{0.7}. \quad (1c)$$

The equivalence scale for two adults is set to 1.41. The economy of scales factor is set at 0.70 for other consumer unit types.

The ITWG document stated that the SPM thresholds would be based on a range of FCSU expenditures. To obtain this range, all consumer units in the estimation samples are ranked from lowest to highest by the value of their two adult-two child equivalent FCSU expenditures. Data are population weighted for this ranking. The SPM thresholds are based on a range of expenditure around the 33rd percentile of FCSU expenditures. The range is defined as within the 30th and 36th percentile points in the FCSU distribution. Restricting the estimation sample to this range of expenditures results in thresholds that are based on the expenditures of a subsample of the original estimation sample composed of two-child consumer units.

The ITWG guidelines state that separate SPM thresholds be produced for owners with mortgages, owners without mortgages, and renters. The reasoning behind this guideline is that thresholds should reflect differing spending needs and housing represents the largest share of the FCSU based thresholds

(see Garner and Short 2010). The ITWG method to account for spending needs by housing status uses the within range means of FCSU and shelter plus utilities overall, and in addition, the means of shelter plus utilities for groups of consumer units distinguished by housing status. To produce housing-based FCSU thresholds, first a SPM threshold that is not distinguished by housing status is produced. The overall threshold equals the mean of the range of FCSU expenditures times 1.2 to represent a multiplier accounting for other basic goods and services. Second, expenditures for overall shelter and utility expenditures are substituted by the shelter plus utility expenditures for each housing status subgroup. Separate SPM thresholds are produced for owners with mortgages, owners without mortgages, and renters. The research experimental SPM housing tenure thresholds are produced using equation (2).

$$SPM\ Threshold_h = 1.2 * FCSU_A - (S + U)_A + (S + U)_h \quad (2)$$

where
h = one of three housing tenure groups:
Owners with mortgages
Owners without mortgages, or
Renters

1.2 = multiplier used to account for expenditures for other basic goods and services, like those for household supplies, personal care, and non-work related transportation.

A = entire estimation sample, within the 30th to 36th percentile range of FCSU expenditures, with FCSU expenditures converted to those for consumer units with two adults and two children without distinction by housing tenure.

FCSU = mean of the sum of expenditures for food, clothing, shelter and utilities for the estimation of sample of CUs within the 30th to 36th percentile range of FCSU expenditures.

$S + U$ = mean of the sum of expenditures for shelter and utilities portions of FCSU for the estimation of sample CUs within the 30th to 36th percentile range of FCSU expenditures.

Using the methods described above, thresholds for 2005-2017 are produced and are presented in Table 1. Two adult-two-child SPM thresholds for owners with mortgages and thresholds for renters are higher than official poverty thresholds. For example, for 2017, the official two-adult-two child poverty threshold is $24,858 (see Fox 2018). This is in contrast to the SPM thresholds for 2017: for owners with mortgages the SPM threshold is $27,085, for owners without mortgages it is $23,261, and for renters, it $27,005.

Since 2011, SPM thresholds have been sent to the Census Bureau for further adjustment and use. One adjustment is to reapply the three-parameter equivalence scale to derive thresholds for consumer units with differing numbers of adults and/or children. A second adjustment is applied to account for differs in prices across geographic areas. [9] The price-adjusted SPM thresholds are used by Census Bureau

[9] For a discussion of geographic adjustment methods and research, see Renwick (2009a,b, 2010, 2011). Also see Ziliak (2010).

staff to produce poverty statistics based on the ITWG guidelines. For the latest Census report in which these SPM thresholds have been used to produce supplemental poverty statistics, see Fox (2018).

III. SPM Poverty Thresholds Based on Expenditures *plus* In-kind Transfers

Including in-kind benefits in thresholds has posed a particular challenge for the production of the SPM since only limited in-kind benefit information is available in the CE. For example, the CE collects information on whether rental housing is subsidized and the rent paid for the unit, but not the market value of the unit; it is this value that is needed to account for the full value of rental housing in the thresholds. In past research, the indicator rental assistance variables were been used in combination with Fair Market Rents from the U.S. Department of Housing and Urban Development (HUD) to impute market rents for subsidized units (see for example, Garner, Gudrais, and Short 2015). However, no information is collected regarding the National School Lunch Program (NSLP) and Women, Infants and Children Program (WIC), or the Low Income Housing Energy Assistance Program (LIHEAP).

The most recent research on in-kind benefit based SPM thresholds was presented by Garner and Gudrais at the 6th Annual BLS-Census Workshop on Empirical Research Using BLS-Census Data, June 6, 2016. The methods presented in that study are again used in this study, but with updates in underlying administrative data used to assign in-kind benefit values. For all but rental subsidies, program participation imputations are produced using a logistic regression approach for missing data and combining CPS and CE data sets. Benefits benefit levels form the U.S. Department of Agriculture (for NSLP and WIC) and U.S. Department of Health and Human Services (for LIHEAP) are assigned to consumer units imputed to be participating in each program. In the Garner and Gudrais (2016) study, and in this study, market rents are estimated using information directly collected from consumer units participating in the CE. This study represents the most recent work on including in-kind benefits to thresholds; we consider it to be our best attempt to account for the inconsistency in SPM thresholds and resources thus far.

Earlier work by Garner (2010), Garner and Hokayem (2012) and Garner, Gudrais, and Short (2015) devised less precise methods for the imputations. In 2010, Garner used program eligibility guidelines and consumer unit characteristics to impute NSLP and WIC benefits. But eligibility rates do not equal participation rates, since not all eligible individuals or households participate in these programs. Thus, in the next study, Garner and Hokayem (2012) used Census Bureau CPS ASEC data to impute NSLP and WIC participation probabilities using consumer unit characteristics expected to be related to program participation. That same approach was used by Garner, Gudrais, and Short (2015) have produced eligibility rates, adjusted by participation in LIHEAP added. The problem with these latter two studies is that the desired outcomes are predicted 0 or 1 participation but the methods employed only allowed for the estimation of probabilities.

A. NSLP, WIC, and LIHEAP Program Participation to CE Data from CPS Data

The method used to impute NSLP, WIC, and LIHEAP benefits to consumer units in the CE results in predicted 0, 1 outcomes for predicted participation. This is the same method used by Renwick (2015) to impute participation from the internal CPS ASEC to the American Community Survey. For each benefit program, a binary variable with responses 1 and 2 is modeled using logistic regression to fit the observations with observed values for the imputed variable and its covariates. Each fitted model

includes the regression parameter estimates and the associated covariance matrix. The fitted models are first based on CPS data, as these are the only data with information on program participation. Then new parameters are drawn from the posterior predictive distribution of parameters. For observations with missing response variables, those in the CE, expected probabilities are computed based on the earlier estimated parameters and covariates. To these probabilities are added a random uniform variate between 0 and 1. The results are predicted outcome values of 0 or 1 for each in-kind benefit program.

Specific questions are asked in the CPS to ascertain whether the consumer unit or someone in the consumer unit participates in WIC, LIHEAP, and NSLP. For WIC, CPS questions ask whether anyone in the household participated in WIC. For LIHEAP, the question refers to whether the household received energy assistance in the last year.[10] For NSLP program participation, several pieces of information are used. In the CPS, the reference person identifies the number of children who "usually" ate a hot lunch.[11] In a separate question, the reference person identifies the number of children who received a free or reduced price lunch. [12] The CPS instrument does not distinguish between children receiving a free lunch and children receiving a reduced price lunch. Answers to CPS questions are used to identify the three mutually exclusive alternatives for the logit model that is specified as multinomial:

1. At least one child in the household ate a subsidized school lunch **and** the child qualified for a free or reduced price (referred to "Subsidized Lunch with a Free or Reduced Price").

2. At least one child in the household ate a subsidized school lunch but no child or children in the household qualified for a free or reduced price (referred to "Subsidized Lunch").

3. No child in the household eats a subsidized school lunch or qualified for a free or reduced price (referred to "No Subsidized Lunch"). This means that the child does not eat a school-provided lunch of any type.

For each of the program participation models, demographic characteristics for the head of household, household characteristics, and variables representing public assistance and geography of residence are regressors. Five years of data are used to produce the thresholds thus five years of CPS data are used in model estimation. CPS ASEC data comprise a pooled sample of households whose data refer to calendar years 2010-2014 but are collected in 2011 through 2015. CE data to which the CPS program participation model coefficients are applied are collected in 2010 quarter two through 2015 quarter one; these data to refer to expenditures made in the previous three months of the interviews and essentially refer to the same time period as the CPS data, 2010 through 2014. The CE data are collected quarterly, so the CE sample is pooled, assuming data from each quarter are independent of data from other quarters. Pooling the data allow for larger sample sizes by state for estimating state fixed effects. To create a consistent sample between the CPS ASEC and the CE, the CPS estimation

[10] The CPS question asks, "At any time last year, (were you/was anyone in this household) on WIC, The Women, Infants, and Children Nutrition Program?" and "Since last October, did the household receive energy assistance?"
[11] The CPS question asks, "During 20XX, how many of the children in this household usually ate a complete hot lunch offered at school?"
[12] The CPS question asks, "During 20XX, how many of the children in this household received free or reduced price lunches because they qualified for the federal school lunch program?"

sample covers all states excluding Iowa, New Mexico, North Dakota, Oklahoma, Vermont, Wyoming, Puerto Rico, Rhode Island.[13]

The universes for the regression models for NSLP, WIC, and LIHEAP rely on different demographic qualifications. The universe for the NSLP model comes from combining the universes of the two CPS questions used to generate the model alternatives outlined in the previous section. These questions cover a child eating hot lunch and the number of children who receive a free or reduced price lunch. To be in the universe for a child eating a hot lunch, a household must have a child between the ages of 5 and 18, inclusive. To be in the universe for children who receive a free or reduced price lunch, a household must have a child between the ages of 5 and 18, inclusive. For outcome 1, they would need to answer YES to the NSLP participation question. The CE universe sample includes all consumer units with a child between the ages of 5 and 18 and whose consumer unit made and expenditure for school meals. The universe for the WIC model comes from the one CPS WIC question about whether anyone in the household participated in WIC. To be in this universe a household had to include at least one female member age 15 or above with a child less than 6 years of age, or include at least one female member between the ages of 15 and 45.[14] The CE WIC universe sample is defined according to the same demographic requirements for the CPS. The LIHEAP universe includes all households/consumer units.

Table 2 lists the explanatory variables and their definitions used in the predicted participation models. Tables 3, 4, and 5, respectively, include the NSLP, WIC, and LIHEAP model variables, and their means and standard errors. In each case, means and standard errors are based on replicate weights using balanced repeated replication (BRR) with Fay's method in the case of the CPS and balanced repeated replication in the case of the CE.[15]

Predicted outcomes are not needed for consumer units with rental subsidies as the CE collects information on this information. That information is used in combination with reported rents for non-subsidized rents to produced imputed market rents. The estimation of rental benefits is presented in the next section.

B. Assigning Benefits

It is assumed that in-kind benefits reflect consumption needs and are time-specific. Thus, when in-kind benefits are imputed, they reflect the value of benefits that were in effect during the interview period. For example, for consumer units who participated in a CE Interview anytime within the 2010 quarter two to 2011 quarter one time period, in-kind benefits reflect 2010 program benefits. Interviews that took place anytime within the 2014 quarter two to 2015 quarter one period reflect 2014 benefit levels.

[13] The Consumer Expenditure Survey, during the periods upon which this study is based, did not sample consumer units in these states. The concern for the CE is to produce population estimates by region, not states.
[14] Defining the universe in this way also includes potentially pregnant women eligible for WIC.
[15] See http://www.bls.gov/cex/anthology/csxanth5.pdf for a description of BRR applied to the CE (Blaha 2003) and to http://smpbff2.dsd.census.gov/pub/cps/march/Use_of_the_Public_Use_Replicate_Weight_File_final_PR_2010.doc for a description of the Fay's method applied to the CPS. Also see Garner (2010b) for an application of the method to NAS thresholds.

1. National School Lunch Program (NSLP)

The second largest food and nutrition program in terms of expenditures (after the Supplemental Nutrition Assistance Program, SNAP) is the National School Lunch Program (NSLP). The NSLP offers free, reduced-price, and subsidized meals for school-aged children. Children qualifying for a free or reduced price lunch receive a larger subsidy. Parents or guardians apply in the beginning of the school year for their children to receive school meals during the year. The school administers the program and records which children receive which type of subsidy. The majority of students participating in the program are in public schools; however, students in private schools can also participate when the program is administered by the school.

The imputed NSLP values are based on payment rates per meal and commodity school lunch program values. Payment rates and commodity values are available online via the U.S. Department of Agriculture (USDA) web site (http://www.fns.usda.gov/nslp/national-school-lunch-program-nslp). Census Bureau estimates are based on the average (over the 48 contiguous states) reported school lunch payment rates, for schools in which less than 60 percent of the lunches served during the second preceding school year were served free or at a reduced price. For this study, these same values are used as inputs, with the exception of four states- Washington, DC, Louisiana, Mississippi, and New Mexico, for which an increased rate for "60% or more" is used to account for the fact that these states typically have a larger percentage of students participating in school lunch programs. Separate increased school lunch reimbursement rates are also used for Alaska and Hawaii; these separate averages are actually produced by the USDA. While the CPS-CE imputation model for NSLP determines whether a consumer unit is likely to fall into one of two categories, (1) free or reduced meals and (2) paid meals, reported food stamps and welfare benefits in the CE are used to make the distinction between free and reduced meals in the threshold sample. The assumption is made that SNAP and/or welfare program eligibility indicate eligibility for free meals, as opposed to reduced price meals. Finally, the appropriate per-meal value (for either free, reduced, or paid meals) is multiplied by the number of children between the ages of 5 and 18, and the number of days students are assumed to be in school. The number of school days by state are obtained from the Department of Education, Schools & Staffing Survey for the 2011-2012 school year. The assigned NSLP benefit value is added to each consumer unit's food expenditure total prior to SPM threshold production.

2. Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)

The Special Supplemental Nutrition Program for Women, Infants and Children (WIC) is designed to provide food assistance and nutritional screening to nutritionally at risk, low-income women, infants, and children ages one to four. Assistance is provided in the form of food, nutrition education, and referrals to health care and other social services. Like SNAP, WIC is funded by the USDA; it is the third largest program based on aggregate benefits, after SNAP and the NSLP. CE does not collect information on WIC. Unlike for SNAP, we assume WIC benefit values are not included in food expenditures and thus are not currently accounted for in SPM thresholds. WIC benefits are not associated with specific dollar amounts like SNAP benefits, but rather are provided in the form of prescribed food packages in which participants may only purchase specific food items, package sizes, and quantities.

CE characteristics data are used in combination with the monthly averages of pre-rebate WIC benefit values (by state) to produce quarterly values for the sample of consumer units determined to be likely to have received WIC benefits. Participating consumer units with children ages 1-4 are simply assigned a value based on the number of children times the average WIC value. Participating consumer units with infants (children less than the age of 1) and deemed to include a potential "early mother" are assigned a higher average infant rebate value per infant. Participating consumer units without children ages 0-4 (presumably pregnant women) receive 9/12 of the average WIC value, as a proxy for having received this benefit for only 9 months of the year. Average WIC benefit data are available on the USDA web site (http://www.fns.usda.gov/wic/women-infants-and-children-wic). The assigned WIC benefit value is added to each consumer unit's food expenditure total prior to SPM threshold production.

3. Low Income Home Energy Assistance Program (LIHEAP)

The Low Income Home Energy Assistance Program (LIHEAP) provides three types of energy assistance to low income residents. This program is administered by the U.S. Department of Health and Human Services (HHS). Under LIHEAP, states may help to pay heating or cooling bills, provide allotments for low-cost weatherization, or provide assistance during energy-related emergencies. States determine eligibility and can provide assistance in various ways including cash payments, vendor payments, two-party checks, vouchers/coupons, and payments directly to landlords. In some states, LIHEAP benefits are not restricted to paying for heating and cooling when received as additional money income to the consumer unit; this additional income can be used by the consumer unit for expenses other than utilities. In these cases, LIHEAP benefits would be included in resources but not in SPM thresholds. No information regarding LIHEAP benefits is collected in the CE. However, the CE Interview does collect information regarding types of fuels and expenditures, and if utilities are included in rents. Whether the fuel is used for heating and cooling versus for cooking is not known.

The value of LIHEAP benefits is a weighted average of average cooling and heating benefit values and participation rates obtained from HHS (2014). The assigned LIHEAP benefit value is added to each consumer unit's utilities expenditure total prior to SPM threshold production. Because of limited availability of data, 2010 values are used for all years (but updated to threshold year dollars with the All-Items CPI).

4. Rent Subsidies

The imputation of rent subsidies for the SPM thresholds is unique in that only CE data is needed in order to make this imputation, since two key questions are asked in the survey: whether the CU lives in public housing or receives a government subsidy for housing. While WIC, NSLP, and LIHEAP imputation methods require CPS data that contains variables on in-kind benefit program participation, rent subsidy imputation pairs data for paid renters and subsidized renters, both in the CE sample, to impute a rent for the latter group. The first step of the imputation method is a logistic regression with "paid rent" as the dependent variable. Independent variables include building characteristics (including unit structure), participation in Medicaid and food stamp programs, various demographic characteristics, and geographic state and year fixed effects. The Mills ratio from the logistic regression is then included in the second stage- a regression using only the paid renter sample, with log rent in 2014$ as the dependent variable, and a series of the same building characteristics used in the first stage

as the independent variables. Geographic state and year fixed effects are again included. The output coefficients from the second stage regression are used to calculate predicted (market) rent values for the subsidized renter consumer units, for which reported rent does not represent the full value of their dwelling.

The rent subsidy values assigned to rent-subsidized consumer units are computed simply by subtracting the reported rent paid from the imputed value of rent (for only units for which the imputed value exceeds the reported value). The difference between the two rent values represents the implicit or explicit subsidy that the consumer unit must have received in order to make a rent payment that is significantly less than the market value, as determined by the two-step rent regression procedure. The imputed rent value resulting from the two-step rent regression procedure is what gets included in the threshold as a value for housing for the rent-subsidized consumer CUs, as opposed to the reported rent.

For the purpose of comparison, another set of SPM thresholds with in-kind benefits is produced with Fair Market Rents (FMR) as the baseline, as opposed to reported rent in the CE. Fair market rent values provide an overestimate of the subsidy received. Fair market rents can be obtained from HUD at the following website: https://www.huduser.gov/portal/datasets/fmr.html.

IV. Summary Statistics

Summary statistics of imputed in-kind benefits for the entire CE population weighted sample are produced to provide us with information regarding how close our estimates are to administrative and other household survey data. CE imputed NSLP, WIC, and LIHEAP benefit aggregates are compared to other sources of estimated in-kind benefit receipts in the U.S. population in Table 6. The primary baseline for comparison is the CPS data, since this is what is used to impute CE values for three out of the four categories of in-kind benefits. The CE aggregate is greater than the CPS aggregate in the case of NSLP and WIC, and lower in the case of LIHEAP and rent subsidies. There is a substantial difference between the two methods in the CE aggregates for rent subsidies. The bulk of the assigned NSLP benefits are for the reduced category, whereas for WIC it is for children 0-5.

Imputed rates of participation in the four in-kind benefit programs for the CE sample are compared with those from different sources in Table 7. The rate of WIC participation is 3.1% for the CPS, and 2.9% for the imputed CE sample. The percentage of the population receiving rent subsidies based on CE imputations is very close to the 4.1% rate in the CPS. The Fair Market Rent method yields a rent subsidy participation rate of 3.4%, while the CE imputed rent method results in a higher rate- 4.1%, due to differences in methodology. Participation in NSLP ends up slightly greater in the CE, at 18.5%, as compared with 17.2% in the CPS. Imputed LIHEAP participation is low in the CE (2.2% as compared with 3.4% in the CPS).

Mean benefit values (the mean across all consumer units that are determined to receive the benefit) are presented in Table 8. The mean values are fairly comparable between the CE and the CPS for NSLP ($535 vs. $534), and LIHEAP ($390 vs. $395). The average estimated WIC benefit in the CE is rather high- $983, as compared with $828 in the CPS. The average imputed rent subsidies resulting from both methods are lower than the average rent subsidy in the CPS- $7,643. The average annual rent subsidy

for the CE imputed rent method is $5,386, and the average rent subsidy for the Fair Market Rent method is $7,078.

V. SPM Thresholds with In-Kind Benefits

Three sets of SPM thresholds and standard errors are presented in Table 9. The first set only includes food stamps, as these are implicitly included in the reported food expenditures in the CE. The second set includes WIC, NSLP, and LIHEAP values for those determined to be participating in these programs, as well as the imputed rent subsidy values. The third set includes the same WIC, NSLP, and LIHEAP values, and rent subsidy values derived from a comparison of reported rent to Fair Market Rents. All thresholds and standard errors are based on replicate weights; the BLS provides 44 replicates for the production of statistics for the CE data.

Statistical tests are conducted to determine if the two sets of thresholds with in-kind benefits are statistically different from each other, and whether there is a statistical difference between thresholds with and without in-kind benefits. The null hypothesis is that the difference is equal to zero. SPM thresholds for Renters and Owners with Mortgages with in-kind benefits are statistically different from thresholds without at the 0.001 significance level. The SPM threshold for Owners without Mortgages with in-kind benefits is statistically significant from the corresponding threshold without in-kind benefits only at the 0.01 significance level. This holds true for thresholds using both rent imputation methods. Understandably, the change from the Fair Market Rent model to the imputed rent subsidy model only results in a significant difference for Renters, at the 0.01 significance level.

The poverty rates produced by the Census Bureau for research purposes using the three sets of SPM thresholds in Table 9 are presented in Table 10. The overall poverty rates are highest for the SPM thresholds with in-kind benefits that utilize the Fair Market Rent model, and predictably lowest for thresholds without in-kind benefits.

VI. Conclusions

The two goals of this study were (1) to describe and present the out-of-pocket spending based SPM thresholds, and (2) to present what we consider our best approach to account for in-kind benefits in SPM thresholds. To meet this last goal, we imputed participation for NSLP, WIC, and LIHEAP in-kind benefit programs using the CPS ASEC data and assigned benefit values from administrative data to these CUs in the CE. Rental subsidies were implicitly accounted for in the SPM thresholds by replacing reported rents by imputed market rents using CE alone. There are three main findings: (1) Out-of-pocket spending based SPM thresholds are higher than official poverty thresholds for owners with mortgages and renters but lower for owners without mortgages (presented for 2014 and 2015); (2) Spending based thresholds for Owners with Mortgages and those for Renters are not statistically significantly different, but both are higher than those for Owners without Mortgages; and (3) SPM thresholds with in-kind benefits are higher than those without benefits for all three housing tenure groups, but with varying levels of significance.

Based on this study, the imputed in-kind benefit aggregates, participation rates, and means for consumer units provide substantial evidence that the inclusion of in-kind benefits in the SPM thresholds is possible, and that current imputation methods provide somewhat reasonable results.

The next step in this research is to continue to improve upon the methods presented in this study to impute in-kind program benefits to consumer units in the CE with more recent data and advances in statistical estimation. After completing this next step, acceptance by the research and policy community at large is needed before in-kind benefit imputations are added to expenditures for SPM threshold production. Currently the SPM thresholds used by the Census Bureau for SPM poverty statistics do not account for in-kind benefits although they are included in resources. In-kind benefit based SPM thresholds are more consistent with the resource measure that those currently being sent by the BLS ever year to the Census Bureau for publication and poverty analysis.

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Chart 1. Poverty Measures: Supplemental, Official, and Relative			
	Supplemental Poverty Measure	**Official Poverty Measure**	**Relative Poverty**
Measurement Unit	All related individuals who live at the same address, any co-resident unrelated children who are cared for by the family (such as foster children), and any co-habitors and their relatives-=consumer unit	Families and unrelated individuals	Household
Resource Measure	Sum of cash income, plus any federal government in-kind benefits that families can use to meet their food, clothing, shelter, and utility needs (FCSU), minus taxes (or plus tax credits), minus work expenses, minus out-of-pocket expenditures for medical expenses.	Gross before-tax money income	Disposable Income
Poverty Threshold	Range of the 30-36th percentile of expenditures for food, clothing, shelter, and utilities (FCUS) plus "a little more" for other basic needs of all consumer units with exactly two children	Cost of minimum food diet in 1963	50 % median equivalized disposable income
Threshold Adjustments	Three parameter equivalence scale Adjust for geographic differences in housing costs using 5 years of ACS data	Vary by family size and composition	Square root of household size
Updating thresholds	Five year moving average of expenditures on FCSU	Consumer Price Index: All items	Annual update

Table 1: Two-Adult-Two-Child BLS-DPINR Research Experimental Supplemental Poverty Measure (SPM) Thresholds*

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Owners with mortgages	**$21,064**	**$22,010**	**$22,772**	**$24,259**	**$24,450**	**$25,018**	**$25,703**	**$25,784**	**$25,639**	**$25,844**	**$25,930**	**$26,336**	**$27,085**
Standard error	*$200*	*$194*	*$171*	*$259*	*$242*	*$323*	*$347*	*$368*	*$289*	*$345*	*$297*	*$280*	*$276*
Percentage of Sample	*0.483*	*0.472*	*0.500*	*0.493*	*0.489*	*0.486*	*0.459*	*0.439*	*0.438*	*0.415*	*0.371*	*0.382*	*0.382*
Owners without mortgages	**$17,643**	**$18,301**	**$19,206**	**$20,386**	**$20,298**	**$20,590**	**$21,175**	**$21,400**	**$21,397**	**$21,380**	**$21,806**	**$22,298**	**$23,261**
Standard error	*$230*	*$279*	*$299*	*$340*	*$335*	*$341*	*$298*	*$233*	*$337*	*$470*	*$417*	*$390*	*$471*
Percentage of Sample	*0.118*	*0.102*	*0.086*	*0.082*	*0.084*	*0.093*	*0.110*	*0.120*	*0.115*	*0.108*	*0.119*	*0.129*	*0.113*
Renters	**$20,641**	**$21,278**	**$22,418**	**$23,472**	**$23,874**	**$24,391**	**$25,222**	**$25,105**	**$25,144**	**$25,460**	**$25,583**	**$26,104**	**$27,005**
Standard error	*$224*	*$241*	*$249*	*$257*	*$345*	*$379*	*$378*	*$398*	*$400*	*$363*	*$282*	*$302*	*$263*
Percentage of Sample	*0.399*	*0.426*	*0.414*	*0.425*	*0.426*	*0.421*	*0.431*	*0.442*	*0.447*	*0.476*	*0.510*	*0.489*	*0.505*

* Based on out-of-pocket expenditures for food, clothing, shelter, and utilities. Shelter expenditures include those for mortgage principal payments.

Source: The 2017 thresholds, shares, and means were produced by Juan Muñoz; earlier years' results were produced by Marisa Gudrais. This work is conducted under the guidance of Thesia I. Garner. Muñoz (Gudrais prior to 2017) and Garner work in the Division of Price and Index Number Research (DPINR), Bureau of Labor Statistics (BLS). **These thresholds and statistics are produced for research purposes only** using the U.S. Consumer Expenditure Interview Survey. **The thresholds, shares, and means are not BLS production quality.** This work is solely that of the authors and does not necessarily reflect the official positions or policies of the Bureau of Labor Statistics, or the views of other staff members within this agency. The 2017 SPM thresholds are final as of September 11, 2018.

NOTES:

1. For methodological details and related research regarding the SPM thresholds, see: http://stats.bls.gov/pir/spmhome.htm

2. Thresholds for 2013-2014 incorporate a change made by the BLS with reference to "other fuels", which are included in utilities. This change was introduced In 2005; however, the 2013 threshold is the first threshold in which the change is reflected. The following UCCs were dropped: 250901 – WOOD/KEROSENE/OTHER FUELS RNTR; 250902 – WOOD/KEROSENE/OTHER FUELS OWND; 250211--COAL RNTR; and 250222 COAL OWND. UCCs that replaced these follow: 250911 – OTHER FUELS RNTR and 250912 – OTHER FUELS OWND.

Table 2: Explanatory Variables in Multinomial Logit and Logit Models

Variable Name	Description
CE Reference Person or CPS Head of Household Variables	
Age	
Age	Age in years
Age_squared	Age squared
Elderly	Reference person or head of household is aged 62 or older
Race	
White, non-Hispanic	Dummy variable for white, non-Hispanic
Black, non-Hispanic	Dummy variable for black, non-Hispanic
Hispanic	Dummy variable for Hispanic
Other race (excl. category)	Dummy variable for other race/non-Hispanic groups
Gender	
Male (excl. category)	Dummy variable for male
Female	Dummy variable for female
Education	
Low education (excl. category)	Dummy variable for low education (less than 12 years)
Medium education	Dummy variable for medium education (high school graduate to college graduate with Bachelor's degree, inclusive)
High education	Dummy variable for high education (greater than Bachelor's degree)
Marital Status	
Married (excl. category)	Dummy variable for married
Widowed	Dummy variable for widowed
Past marriage	Dummy variable for past marriage
Never married	Dummy variable for never married
Employment	
Not in labor force (excl. category)	Dummy variable for not in the labor force
Unemployed	Dummy variable for 0 hours worked
Part-time	Dummy variable for hours worked between 0 and 35
Full-time	Dummy variable for greater than or equal to 35 hours worked
Household Variables	
Household income	Household income
Household size	Household size
Housing Tenure	
Owner (excl. category)	
Renter	
Presence of disabled member	Dummy variable when at least one person in CU/HH is disabled
Single parent	Dummy variable when a single parent with child or children
Age composition of children	
Number of children 0-5	Number of children between ages 0 and 5, inclusive
Number of children 5-10	Number of children between ages 5 and 10, inclusive
Number of children 11-13	Number of children between ages 11 and 13, inclusive
Number of children 14-18	Number of children between ages 14 and 18, inclusive
Public Assistance	
SNAP	Dummy variable for anyone in household receiving food stamps
Welfare	Dummy variable for anyone in household receiving welfare
Medicaid	Dummy variable for anyone in household covered by Medicaid
Residence	
Urban	Dummy variable for residing in a metropolitan area
Rural (excl. category)	Dummy variable for residing in a nonmetropolitan area

Table 3: Weighted Sample Summary Statistics for NSLP Model: CPS and CE Interview

	CPS ASEC 2011-2015 (n=109,317)[a]		CE Interview 2010Q2-2015Q1 (n=36,338)[b]	
Variable Name	**Mean**	**Standard Error**	**Mean**	**Standard Error**
Head of Household/ Reference Person Variables				
Age	42.29	0.043	42.20	0.232
Race				
White, non-Hispanic	0.58	0.002	0.58	0.024
Black, non-Hispanic	0.14	0.001	0.15	0.005
Hispanic	0.20	0.001	0.21	0.027
Other race (excl. category)	0.08	0.001	0.06	0.006
Gender				
Male (excl. category)	0.47	0.002	0.41	0.013
Female	0.53	0.002	0.59	0.013
Education				
Less than high school graduate	0.13	0.001	0.15	0.014
High school graduate	0.45	0.002	0.44	0.013
Associate's or Bachelor's degree	0.31	0.002	0.30	0.012
Master's, professional, or PhD	0.11	0.001	0.11	0.008
Marital Status				
Married (excl. category)	0.66	0.002	0.69	0.012
Widowed	0.03	0.001	0.02	0.003
Past married	0.17	0.002	0.16	0.008
Never married	0.15	0.001	0.13	0.008
Employment				
Not in labor force (excl. category)	0.20	0.002	0.19	0.009
Unemployed	0.05	0.001	0.02	0.002
Part-time	0.12	0.001	0.14	0.007
Full-time	0.63	0.002	0.65	0.010
Household/Consumer Unit Variables				
Household Income, 2014$	$88,951	$410	$82,502	$2,452
Household/ Consumer Unit Size	4.10	0.006	4.17	0.036
Age composition of children				
Number of children 5-10	0.74	0.003	0.75	0.015
Number of children 11-13	0.37	0.002	0.33	0.011
Number of children 14-18	0.62	0.003	0.65	0.013
Public Assistance				
SNAP	0.17	0.002	0.16	0.013
Welfare	0.03	0.001	0.02	0.003
Residence				
Urban	0.72	0.004	0.87	0.042
Rural (excl. category)	0.28	0.004	0.13	0.042
School Lunch Participation				
Subsidized Lunch, FR	30.1%	0.002	-	-
Subsidized Lunch	37.0%	0.002	-	-
No Subsidized Lunch	32.9%	0.002	-	-

[a] U.S. Census Bureau, Current Population Survey, 2011-2015 Annual Social and Economic Supplement. For outcomes, "Subsidized, FR" refers to receiving a subsidized lunch with a free or reduced price, "Subsidized Lunch" refers to receiving a subsidized paid lunch, and "No Subsidized Lunch" refers to not receiving a subsidized lunch. Standard errors are estimated using replicate weights (Fay's method). For information on sampling and nonsampling error, see www.census.gov/apsd/techdoc/cps/cpsmar10.pdf.

[b] Bureau of Labor Statistics, U.S. Department of Labor, Consumer Expenditure Interview Survey, 2010Q2-2015Q1. Sample statistics are weighted using the quarterly consumer unit weights. For information on sampling and nonsampling error, see http://www.bls.gov/cex/anthology/csxanth5.pdf.

Table 4: Weighted Sample Summary Statistics for WIC Model: CPS and CE Interview

	CPS ASEC 2011-2015 (n=152,786)[a]		CE Interview 2010Q2-2015Q1 (n=58,002)[b]	
Variable Name	**Mean**	**Standard Error**	**Mean**	**Standard Error**
Head of Household/ Reference Person Variables				
Age	38.93	0.039	38.65	0.210
Race				
White, non-Hispanic	0.60	0.001	0.60	0.020
Black, non-Hispanic	0.14	0.001	0.14	0.004
Hispanic	0.18	0.001	0.18	0.022
Other race (excl. category)	0.08	0.001	0.07	0.006
Gender				
Male (excl. category)	0.44	0.002	0.38	0.010
Female	0.56	0.002	0.62	0.010
Education				
Less than high school graduate	0.11	0.001	0.12	0.011
High school graduate	0.44	0.002	0.44	0.011
Associate's or Bachelor's degree	0.33	0.002	0.33	0.011
Master's, professional, or PhD	0.12	0.001	0.11	0.007
Marital Status				
Married (excl. category)	0.60	0.002	0.61	0.009
Widowed	0.02	0.001	0.02	0.003
Past married	0.13	0.001	0.13	0.006
Never married	0.25	0.002	0.24	0.007
Employment				
Not in labor force (excl. category)	0.19	0.001	0.18	0.008
Unemployed	0.05	0.001	0.02	0.002
Part-time	0.11	0.001	0.15	0.008
Full-time	0.64	0.002	0.66	0.010
Household/Consumer Unit Variables				
Household Income, 2014$	$84,429	$327	$76,352	$1,721
Household/ Consumer Unit Size	3.44	0.006	3.44	0.020
Age composition of children				
Number of children 0-5	0.43	0.002	0.45	0.008
Public Assistance				
SNAP	0.15	0.001	0.13	0.011
Welfare	0.03	0.001	0.02	0.003
Residence				
Urban	0.73	0.003	0.87	0.041
Rural (excl. category)	0.27	0.003	0.13	0.041
WIC Participation (%)	6.9%	0.001	-	-

[a] U.S. Census Bureau, Current Population Survey, 2011-2015 Annual Social and Economic Supplement. Standard errors are estimated using replicate weights (Fay's method). For information on sampling and nonsampling error, see www.census.gov/apsd/techdoc/cps/cpsmar10.pdf.
[b] Bureau of Labor Statistics, U.S. Department of Labor, Consumer Expenditure Interview Survey, 2010Q2-2015Q1. Sample statistics are weighted using the quarterly consumer unit weights. For information on sampling and nonsampling error, see http://www.bls.gov/cex/anthology/csxanth5.pdf.

Table 5: Weighted Sample Summary Statistics for LIHEAP Model: CPS and CE Interview

	CPS ASEC 2011-2015 (n=312,035)[a]		CE Interview 2010Q2-2015Q1 (n=132,663)[b]	
Variable Name	**Mean**	**Standard Error**	**Mean**	**Standard Error**
Head of Household/ Reference Person Variables				
Age	50.63	0.031	49.98	0.282
Elderly	0.28	0.001	0.27	0.004
Race				
White, non-Hispanic	0.69	0.001	0.69	0.017
Black, non-Hispanic	0.13	0.001	0.12	0.004
Hispanic	0.12	0.000	0.13	0.018
Other race (excl. category)	0.06	0.000	0.06	0.004
Gender				
Male (excl. category)	0.51	0.001	0.47	0.008
Female	0.49	0.001	0.53	0.008
Single Parent	0.05	0.000	0.05	0.003
Disabled Household Member	0.11	0.001	0.06	0.004
Renter	0.34	0.002	0.35	0.002
Education				
Less than high school graduate	0.11	0.001	0.13	0.010
High school graduate	0.47	0.001	0.46	0.009
Associate's or Bachelor's degree	0.30	0.001	0.30	0.008
Master's, professional, or PhD	0.12	0.001	0.12	0.006
Marital Status				
Married (excl. category)	0.51	0.001	0.51	0.006
Widowed	0.10	0.001	0.09	0.004
Past married	0.18	0.001	0.18	0.007
Never married	0.21	0.001	0.22	0.006
Employment				
Not in labor force (excl. category)	0.35	0.001	0.32	0.007
Unemployed	0.04	0.000	0.01	0.001
Part-time	0.10	0.001	0.13	0.006
Full-time	0.51	0.001	0.54	0.008
Household/Consumer Unit Variables				
Household Income, 2014$	$75,239	$263	$67,191	$1,373
Household/ Consumer Unit Size	2.51	0.004	2.49	0.001
Age composition of children				
Number of children 0-5	0.19	0.001	0.20	0.003
Public Assistance				
SNAP	0.11	0.001	0.10	0.008
Welfare	0.02	0.000	0.01	0.001
Residence				
Urban	0.71	0.003	0.86	0.041
Rural (excl. category)	0.29	0.003	0.14	0.041
LIHEAP Participation (%)	3.4%	0.000	-	-

[a] U.S. Census Bureau, Current Population Survey, 2011-2015 Annual Social and Economic Supplement. Standard errors are estimated using replicate weights (Fay's method). For information on sampling and nonsampling error, see www.census.gov/apsd/techdoc/cps/cpsmar10.pdf.
[b] Bureau of Labor Statistics, U.S. Department of Labor, Consumer Expenditure Interview Survey, 2010Q2-2015Q1. Sample statistics are weighted using the quarterly consumer unit weights. For information on sampling and nonsampling error, see http://www.bls.gov/cex/anthology/csxanth5.pdf.

Table 6: CE Imputed In-Kind Benefits for the U.S. : Aggregates					
(In Billion 2014$)					
Data Source	**NSLP**	**WIC[1]**	**LIHEAP**	**Rent Subsidies (FMR)**	**Rent Subsidies (CE Imputed)**
CE Imputed TH2014[a]	$12.3	$3.6	$1.1	$29.8	$27.5
	Free = $4.7	*Children = $2.1*			
	Reduced = $5.7	*Infants = $1.2*			
	Paid = $1.9	*Women = $0.3*			
CPS 2014[b]	$12.0	$3.4	$1.8	$41.2	
USDA 2014[c]	$10.4 - $10.5[2]				
USDA Calendar Year 2014[d]		$6.1			
HHS FY2010[e]			$3.2		
Heating			$2.9		
Cooling			$0.3		
HUD 2014[f]				$37.0	
Public Housing				$6.2	
Voucher and other				$30.9	
USDA 2014				$1.1	

[1] CE estimates and USDA based on pre-rebate values for infant food; CPS values based on cost to USDA, not benefit value

[2] Lower value assumes all schools less than 60% free/reduced lunch; higher value assumes all schools 60% or higher free/reduced lunch

[a] Consumer Expenditure Survey Data from 2010Q2 - 2015Q1.

[b] U.S. Census Bureau, Current Population Survey Data, 2015 (with 2014 as the reference period) Annual Social and Economic Supplement.

[c] NSLP data from USDA: http://www.fns.usda.gov/pd/child-nutrition-tables. Total for 9 months: January - May, and September - December.

[d] WIC data from USDA: http://www.fns.usda.gov/pd/wic-program, final data.

[e] State-level FY2010 data on number of participating households and average LIHEAP benefit; obtained via special request for data from HHS. FY2010 data is the latest available.

[f] Rent subsidy data from HUD: https://www.huduser.gov/portal/datasets/picture/yearlydata.html

Table 7: CE Imputed In-Kind Benefits for the U.S. : Consumer Unit / Household Participation					
Data Source	**NSLP**	**WIC[1]**	**LIHEAP**	**Rent Subsidies (FMR)**	**Rent Subsidies (CE Imputed)**
CE Imputed TH2014[a]	18.5%	2.9%	2.2%	3.4%	4.1%
	Free = 3.5%	*Children = 1.9%*			
	Reduced = 5.0%	*Infants = 0.5%*			
	Paid = 10.1%	*Women = 0.6%*			
CPS 2014[b]	17.2%	3.1%	3.4%	4.1%	
HHS FY2010[c]					
Heating			6.3%		
Cooling			0.8%		
HUD 2014[d]				3.9%	
Public Housing				0.9%	
Voucher and other				3.1%	
USDA 2014				0.2%	

[1] CE estimates based on pre-rebate values for infant food

[a] Consumer Expenditure Survey Data from 2010Q2 - 2015Q1.

[b] U.S. Census Bureau, Current Population Survey Data, 2015 (with 2014 as the reference period) Annual Social and Economic Supplement.

[c] State-level FY2010 data on number of participating households and average LIHEAP benefit; obtained via special request for data from HHS. FY2010 data is the latest available.

[d] Rent subsidy data from HUD: https://www.huduser.gov/portal/datasets/picture/yearlydata.html

Table 8: CE Imputed In-Kind Benefits for the U.S. : Average Annual Benefits per Consumer Unit / Household					
(In 2014$)					
Data Source	**NSLP**	**WIC[1]**	**LIHEAP**	**Rent Subsidies (FMR)**	**Rent Subsidies (CE Imputed)**
CE Imputed 2014[a]	$535	$983	$390	$7,078	$5,386
	Free = $1,098	*Children = $904*			
	Reduced = $912	*Infants = $2,052*			
	Paid = $154	*Women = $400*			
CPS 2014[b]	$534	$828	$395	$7,643	
HHS FY2010[c]					
Heating			$406		
Cooling			$332		
HUD 2014[d]				$7,992	
Public Housing				$5,784	
Voucher and other				$9,500	
USDA 2014				$4,148	

[1] CE estimates based on pre-rebate values for infant food

[a] Consumer Expenditure Survey Data from 2010Q2 - 2015Q1.

[b] U.S. Census Bureau, Current Population Survey Data, 2015 (with 2014 as the reference period) Annual Social and Economic Supplement.

[c] State-level FY2010 data on number of participating households and average LIHEAP benefit; obtained via special request for data from HHS. FY2010 data is the latest available.

[d] Rent subsidy data from HUD: https://www.huduser.gov/portal/datasets/picture/yearlydata.html

Table 9: FCSU (with In-Kind Benefits) Expenditures and Thresholds Based on 30th to 36th Percentile FCSU Expenditure Range: 2014

	2A+2C Consumer Units																	
	With Only Food Stamps (n=895)						FCSU + NSLP + WIC + LIHEAP + Rent Subsidy (Imputed) (n=911)						FCSU + NSLP + WIC + LIHEAP + Rent Subsidy (FMR) (n=907)					
Expenditure Groups	30-36th percentile range of FCSU	*Std. Error*	Shelter + Utilities within FCSU 30-36 range	*Std. Error*	FCSU Thresholds	*Std. Error*	30-36th percentile range of FCSU	*Std. Error*	Shelter + Utilities within FCSU 30-36 range	*Std. Error*	FCSU Thresholds	*Std. Error*	30-36th percentile range of FCSU	*Std. Error*	Shelter + Utilities within FCSU 30-36 range	*Std. Error*	FCSU Thresholds	*Std. Error*
With Subsidies																		
FCSU	$20,982	*(269.65)*					$21,699	*(256.27)*					$21,852	*(249.17)*				
Food	$7,514	*(133.30)*					$8,000	*(98.85)*					$7,984	*(102.91)*				
Food Expenditures Only	-	-					$7,547	*(97.54)*					$7,539	*(105.65)*				
Imputed NSLP Subsidy	-	-					$338	*(25.55)*					$334	*(19.30)*				
Imputed WIC Subsidy	-	-					$115	*(11.03)*					$111	*(11.87)*				
Clothing	$1,023	*(37.98)*					$1,047	*(37.15)*					$1,050	*(40.81)*				
Shelter	$8,501	*(251.56)*					$8,743	*(243.78)*					$8,970	*(247.06)*				
Shelter Expenditure Only	-	-					$8,323	*(280.74)*					$8,545	*(249.97)*				
Imputed Rent Subsidy	-	-					$420	*(82.45)*					$425	*(76.78)*				
Utilities	$3,945	*(77.66)*					$3,909	*(80.62)*					$3,848	*(97.77)*				
Utilities Expenditures Only	-	-					$3,902	*(81.35)*					$3,841	*(97.55)*				
Imputed LIHEAP Subsidy	-	-					$8	*(2.55)*					$7	*(2.21)*				
Other	*$4,196*	*(53.93)*					*$4,340*	*(51.25)*					*$4,370*	*(49.83)*				
Treatment of shelter+utilities																		
Not accounting for housing status			$12,445	*(289.36)*					$12,653	*(274.78)*					$12,819	*(283.50)*		
Accounting for housing status																		
Owners with mortgages			$13,112	*(319.18)*	**$25,844**	*(345.32)*			$13,303	*(285.13)*	**$26,689**	*(313.25)*			$13,338	*(289.56)*	**$26,742**	*(310.50)*
Owners without mortgages			$8,648	*(420.24)*	**$21,380**	*(469.54)*			$8,914	*(339.65)*	**$22,300**	*(345.93)*			$9,095	*(382.60)*	**$22,499**	*(386.89)*
Renters			$12,727	*(316.61)*	**$25,460**	*(363.38)*			$12,962	*(311.52)*	**$26,348**	*(355.92)*			$13,172	*(318.34)*	**$26,576**	*(344.05)*
S+U Shares						Shares						Shares						Shares
Accounting for housing status																		
Owners with mortgages						50.7%						49.8%						49.9%
Owners without mortgages						40.4%						40.0%						40.4%
Renters						50.0%						49.2%						49.6%

CE sample restricted to owners with and without mortgages, and renters. Annual CPI-U All Items were used to adjust quarterly expenditures to 2014 year dollars. Five years of CE Interview data were used to produce these estimates; quarterly Interview reports were considered to be independent, as in official BLS publications of CE data.

*Threshold = (1.2*FCSU) - (shelter+utilties share for all) + (shelter+utilties for subgroup)

Table 10. Experimental SPM-IK Poverty Threshold Poverty Rates: 2014

By Age	All Ages	Under 18 Years	18 to 64 Years	65 Years and Older
Only Implicit SNAP in Thresholds[1]	15.3%	16.7%	15.0%	14.4%
CE Imputations and CE-Based Imputed Rent Subsidy	16.4%	18.1%	15.9%	15.5%
CE Imputations and FMR Method for Rent Subsidy	16.6%	18.4%	16.1%	15.7%

By Housing Tenure	All Housing Tenures	Owners with Mortgages	Owners without Mortgages	Renters
Only Implicit SNAP in Thresholds[1]	15.3%	8.1%	13.0%	26.1%
CE Imputations and CE-Based Imputed Rent Subsidy	16.4%	8.6%	14.0%	27.8%
CE Imputations and FMR Method for Rent Subsidy	16.6%	8.7%	14.2%	28.2%

Poverty rates produced by Trudi Renwick at the US Census Bureau.

[1]Defined the same as published SPM thresholds with no imputed subsidy benefits in thresholds. The overall poverty rate of 15.3% is the same as reported by Short (2015): https://www.census.gov/content/dam/Census/library/publications/2015/demo/p60-254.pdf