

Online Appendix for “Building a Consumption Poverty Measure: Initial Results Following Recommendations of a Federal Interagency Working Group”

Thesia I. Garner, Brett Matsumoto, Jake Schild, Grayson Armstrong, Caleb Cho, Juan Munoz*

Bureau of Labor Statistics

A. Technical Appendix

CE Interview Survey

The U. S. Consumer Expenditure Survey (CE) Interview component is the base data set upon which the consumption measure and poverty statistics are derived. The CE is a household survey sponsored by the BLS and is designed to measure expenditures at the consumer unit level.¹ The survey has two components, an Interview and a Diary; each instrument has its own sample, and thus, Diary and Interview responses cannot be combined at the consumer unit level. The Interview is designed to be administered, by personal interview, four times to each consumer unit (CU) at three-month intervals. The reference period for expenditures for almost all goods and services is the three months prior to the interview. The Diary component is a record keeping instrument designed to collect expenditures on frequently purchased categories of goods and services during two consecutive weeks. For each instrument, demographic information and income are collected; the reference period for income is the previous 12 months.² Consumer units can enter the Interview and Diary samples anytime during a calendar year; thus, reported expenditures and income can reflect those in overlapping calendar years. The BLS estimates that less than one quarter of all CUs participating in the Interview provide data for a calendar year (Erhard 2021). For this study, we use data from the Interview only; approximately 97 percent of total expenditures, when defined as those reflected in the integration of Diary and Interview data, are collected in the Interview.³ Items such as postage and nonprescription drugs are not collected in the Interview Survey. Also not collected are detailed food and beverage expenses, but these are collected with global questions in the Interview.⁴

* Thesia I. Garner (Contact), garner.thesia@bls.gov; Brett Matsumoto, Matsumoto.Brett@bls.gov; Jake Schild, Schild.Jake@bls.gov; Grayson Armstrong, Armstrong.Grayson@bls.gov; Caleb Cho, Cho.Caleb@bls.gov; Juan Munoz, Munoz.Juan@bls.gov

¹ A consumer unit comprises either: (1) all members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their income to make joint expenditure decisions. Financial independence is determined by the three major expense categories: housing, food, and other living expenses. To be considered financially independent, at least two of the three major expense categories are to be provided entirely, or in part, by the respondent. (<https://stats.bls.gov/cex/csxgloss.htm>)

² For additional information in the CE, see: <https://stats.bls.gov/cex/home.htm>.

³ This percentage is calculated using 2020 internal Interview only data (Interview only tabular data released by request) and Integrated Diary and Interview published data (from <https://stats.bls.gov/cex/tables/calendar-year/mean/cu-all-multi-year-2013-2020.pdf>). Mean Interview only total expenditures equal to \$59,384, and mean Integrated total expenditures equal to \$61,334.

⁴ See BLS Handbook of Methods (2021). <https://stats.bls.gov/opub/hom/cex/pdf/cex.pdf>

One challenge with using the CE Interview data is that it is difficult to generate representative annual expenditures at the consumer unit level since not all consumer units participate in all four interviews, and when they do, the expenditures do not necessarily reflect those made in a calendar year. Thus, for this study, we use quarterly data from 2015Q2 through 2021Q1 to produce the spending and consumption measures and resulting poverty statistics. We refer to each year in our series by year, for example 2015 with quarterly data collected in 2015Q2-2016Q1. With this approach we assume that each quarter represents an independent sample that is representative of the U.S. population.⁵

Different measures of expenditures and consumption are produced. We start with the CE publication definition of total expenditures,⁶ but subtract miscellaneous expenditures since they are not collected each quarter. Our most comprehensive measure of consumption includes the flow of services from owner occupied housing and the stock of vehicles owned, and public in-kind benefits. Excluded are expenditures for the following: those associated with owning a primary residence or vacation home; the purchase and financing of vehicles; cash contributions; life, endowment, annuities, and other personal insurance; retirement, pensions, and Social Security; healthcare; and education.

For comparison, we also produce an income measure using after tax income in the CE with the value of public in-kind benefits added. CE income also includes the cash value of Supplemental Nutrition Assistance Program (SNAP) benefits. After tax income is calculated using imputed federal and state income taxes based on TAXSIM.

Public In-kind Benefits

Public in-kind benefits include those for rental assistance, Low Income Home Energy Assistance Program (LIHEAP), the National School Lunch Program (NSLP), and the Supplementary Nutrition Program for Women, Infants, and Children (WIC). SNAP benefits are not imputed to the consumption measure as they are assumed to be accounted for implicitly in reports of food expenditures; it is expected that consumer units use SNAP benefits before other sources of income or credit to pay for food. Public in-kind transfers of rental assistance are derived from regression models using CE Interview collected rental unit characteristics and rent paid. Included in consumption is the difference in imputed and reported rents for renters receiving government assistance with rents, those living in public housing, and those living in rent-controlled units.

⁵ This is in contrast to the approach taken by others who produce annual consumption measures (e.g., to study inequality or poverty) by restricting the data to consumer units with four complete interviews with population weights adjusted to reflect specific consumer unit characteristics (e.g., Fisher et al. 2015), multiplying each quarterly interview consumption values by four to approximate annual values (e.g., Meyer and Sullivan 2012), or adjusting the weights to reflect the number of quarterly interviews in which consumer units participated (e.g., Brouillette et al., 2021).

⁶ Total expenditures consist of the transaction costs, including excise and sales taxes, of goods and services acquired during the interview or recordkeeping period. Expenditure estimates include expenditures for gifts but exclude purchases or portions of purchases directly assignable to business purposes. Periodic credit or installment payments on goods or services already acquired are also excluded. The full cost of each purchase is recorded, even though full payment may not have been made at the date of purchase. The order of the expenditures listed here follows the order of presentation in published CE tables. The major categories of expenditures include the following: food, housing, apparel and services, transportation, healthcare, entertainment, and other expenditures. *Other expenditures include the following: personal care products and service; reading; education; tobacco products and smoking supplies; miscellaneous; cash contributions; life, endowment, annuities, and other personal insurance; retirement, pensions, and Social Security.*

No information is collected in the Interview regarding LIHEAP, NSLP, or WIC. Data from the Current Population Annual Social and Economic Supplement (CPS-ASEC) were combined with CE data to impute LIHEAP benefits to consumer units and receipt of benefits from the NSLP and WIC. NSLP benefits from the USDA were assigned to consumer units by imputing NSLP receipt and using the same number of school days for all states for 2015 through 2019. Benefit levels for 2020 were assigned using a similar procedure, but the amount of the benefit varies based on the number of school days in session and assumptions regarding the number of days not in school, but with the possibility of receiving benefits via SNAP Electronic Benefit Transfers (EBT).⁷ WIC benefits from USDA were assigned to consumer units with imputed WIC receipt and varied by the number of infants, children, and mothers in the WIC sample. In addition to the average WIC food benefit being assigned to each member in a WIC consumer unit, benefits reflecting the value the infant formula rebates are also added. Over the last several years states have begun to distribute WIC benefits using EBTS. For those states having fully implemented EBTS, only the infant formula rebates were assigned to WIC consumer units.⁸ As with SNAP EBT, food expenditures are assumed to implicitly account for WIC benefits distributed via EBT.

Rental Equivalence of Owned Homes and Rents for Renters

The flow of services from owner occupied housing are based on respondents' answers to the following question: *If someone were to rent this "dwelling" how much do you think it would rent for monthly, unfurnished, and without utilities?* This question is asked regarding one's primary residence, as well as for vacation homes, and is based on when the interview takes place. In order to include a value of rent for renters that is most comparable to current owners' rental equivalence, we used the last month of rent paid rather than the sum of the rents reported for the past three months (the reference period). The quarterly value of all rents paid are included in CE publications.

The rental equivalence of owners' primary residences (where they live at the time of the interview), and the rental equivalence for vacation homes and time shares are available in the CE Interview data files. Included in the most comprehensive consumption measure are the rental equivalences for primary residences and vacation homes for own use as well as those available for rent to others for part of the year. Not included in consumption are the rental equivalence for time shares.

Vehicle Flow of Services: Depreciation and Opportunity Costs

The value of the flow of services from owned vehicles is a function of vehicle depreciation and the opportunity cost of owning their stock of vehicles versus another asset. Depreciation and opportunity costs depend on the current market value of the stock of vehicles owned. Depreciation rates are first estimated using vehicle characteristics (original purchase price, make, model and year, and whether used or new). Then current market values are also estimated. Service flows from the stock of vehicles owned are produced only for cars and trucks since the characteristic information for the other vehicles (e.g., motorcycles, RVs, private airplanes) is not sufficient to estimate the current market values. Pooled quarterly data from CE Interview periods 1996Q1 through 2021Q1 are used to estimate age specific vehicle depreciation rates and current market values. There are unique age specific depreciation rates

⁷ See Shrider (2021).

⁸ See the following link to the USDA WIC EBT Status Report (January 2022) <https://www.fns.usda.gov/wic/wic-ebt-activities>.

across all interview years. The opportunity costs are estimated using the current market value and long-term security rates. The ones that we use are the “Treasury Long-Term Average (Over 10 Years), Inflation-Indexed, Percent, Annual, Not Seasonally Adjusted.” The annual rates are derived from the monthly rates published on the FRED website: <https://fred.stlouisfed.org/series/DLTIIT>.

Relative Poverty Thresholds and Equivalence Scales

The relative poverty thresholds are derived based on the ranking of population weighted equivalized income, expenditures, and consumption. Consumer unit level values of income, expenditures, and consumption are converted to equivalized values by dividing by the number of equivalent adults in the consumer unit. The number of equivalent adults is based on applying the three-parameter scale to the adults and children in the consumer unit. The equivalence adjustment reflects that (1) on average, children need or consume less than adults; (2) as consumer unit size increases, expenditure and consumption needs do not increase at the same rate; and (3) the increase in need is larger for a first child of a single-parent family than the first child of a two-adult family. The three-parameter scale is calculated in the following way:

- One and two adults: scale = (number of adults)^{0.5}
- Single parents: scale = (number of adults + 0.8*first child + 0.5*other children)^{0.7}
- All other families: scale = (number of adults + 0.5*number of children)^{0.7}

In the calculation used to convert consumer unit income, expenditures, and consumption for two adults, the scale is set to 1.41. The economy of scale factor is set at 0.70 for other family types, which is within the 0.65 to 0.75 range recommended by the NAS panel that released a report on a new approach to measuring poverty in the U.S. (NRC 1995).

Absolute Poverty Thresholds

The absolute poverty thresholds are either anchored in 2015 or the thresholds are those that result when the poverty rate is anchored to 2015. Absolute anchored thresholds are based on the anchor being the 2015 relative consumption_4 threshold. The Absolute thresholds based on anchoring the poverty rates are based on the poverty rate for the 2015 relative consumption_4 threshold. Both absolute thresholds are updated to 2016 through 2020 using the Chained CPI-U.⁹

B. ITWG Recommendations

The ITWG, in their final report, made specific recommendations regarding the development of a measure of consumption to be used for poverty statistics.¹⁰ While the working group referred to consumption as a resource measure, it is our position that consumption is an outcome, or well-being, measure as opposed to a resource measure. That aside, in this section we summarize the primary recommendations regarding the development of a consumption measure, equivalence scales in developing a poverty threshold, and the role of the BLS in particular.

⁹ The C-CPI-U employs a formula that reflects the effect of substitution that consumers make across item categories in response to changes in relative prices. The C-CPI-U designed to account for consumer substitution between item categories, any remaining substitution bias (as compared to the CPI-U) would be quite small. See <https://www.bls.gov/cpi/additional-resources/chained-cpi.htm>

¹⁰ For the full report, published on January 14, 2021, see ITWG (2021).

The recommendations can be divided into those that are broader in scope and those that focus on the specifics of consumption poverty measurement. Broader recommendations include that the BLS be the federal government agency to develop a measure of consumption, which will be used to produce poverty statistics, and that the BLS engage with stakeholders and experts throughout the development of the measure. Specific recommendations regarding the construction of the measure include the following: (1) two new sets of research measures of consumption-based resources be produced, one that includes a value of health insurance and one that does not; (2) education not be considered part of consumption because education is generally considered an investment in human capital; (3) service flows from owner-occupied shelter and the value of the service flows from owned vehicles be included in consumption; (4) administrative data be used to supplement or replace survey collected data, but when such data are not available, regression-based modeling should be used to improve the quality of estimates of expenditures and in-kind program participation; (5) in the development of a poverty threshold, an equivalence scale be applied that accounts for the potentially differing needs of adults and children and economies of scale; and (6) that the CE Interview be used as the source of data for this work. See below for a list of the recommendations related to consumption and the BLS.

In our study, we implement several of these recommendations. First, with the presentation of results from this study, we begin our engagement with stakeholders and experts on poverty measurement. Second, we use the CE Interview as the primary data set to produce our consumption measure and poverty statistics. Third, we include in consumption the flow of services from owner-occupied housing and the flow of services from vehicles. Fourth, we exclude health and education as components of consumption, which partially implements the recommendation of producing versions with and without values for health insurance. Fifth, we use regression-based modeling in combination with administrative in-kind benefits data. And finally, we applied an equivalence scale that accounts for the differing needs of adults and children and economies of scale in consumption.

Recommendations of the Interagency Technical Working Group (ITWG) on Evaluating Alternative Measures of Poverty¹¹ Focused on Consumption or the Bureau of Labor Statistics (identified by recommendation number in the report)

1. The Working Group recommends that the Census Bureau and the Bureau of Labor Statistics engage with stakeholders and other experts throughout the development of the recommended measures, including soliciting additional public comment as needed. In particular, the Working Group recommends expert input through a National Academy of Sciences panel.

5. The Working Group recommends that the Bureau of Labor Statistics develop and publish two new sets of research measures of consumption-based resources, one that includes a value of health insurance and one that does not.

6. The Working Group recommends that the Census Bureau and the Bureau of Labor Statistics use, where available and when appropriate, administrative data to supplement or replace the use of survey

¹¹ From *Final Report of the Interagency Technical Working Group on Evaluating Alternative Measures of Poverty*, January 14, 2021. Available at <https://www.bls.gov/evaluation/final-report-of-the-interagency-technical-working-group-on-evaluating-alternative-measures-of-poverty.pdf>

data for developing the recommended measures.

14. The value of health insurance should not depend on the disability or health status of individuals.

17. The Working Group recommends that expenditures on education be excluded from the recommended extended income-based and consumption-based resource measures because education is generally considered an investment in human capital.

19. The Working Group recommends continued research and additional stakeholder and expert engagement on whether and how to treat education within resource measures.

22. The Working Group recommends, taking into consideration the advantages and disadvantages for each of the above approaches for correcting for missing or misreported data, the application of all three approaches, where appropriate, in the following order: Methods that combine administrative data with survey data are the preferred approach for adjusting survey data to correct for misreporting and missing data. These methods may involve direct replacement of survey responses with administrative reports when research supports the quality of the administrative records relative to survey reports. The administrative data need to be available for use in production and the administrative data must also be available in a timely fashion. When survey reports conflict with administrative records for particular individuals, research should examine criteria to determine which source to use for the poverty estimates. Consistent with Foundations for the Evidence-based Policymaking Act of 2018, efforts to encourage and facilitate data sharing across government agencies should be strengthened. Research to assess ways in which survey data might be made more comparable to administrative data (e.g., changing the reference period for income from the previous 12 months to the previous calendar year) should be encouraged. Regression-based modeling (with or without individual-level or aggregate administrative data) can also improve the quality of estimates of income, expenditures, and program participation. These regression-based techniques can be used, for example, when sharing agreements do not allow for direct substitution, there are significant lags in the availability of administrative data, or administrative data are not available for all geographies or years. Regression-based modeling such as Sequential Regression Multiple Imputation (SRMI) should replace hot deck imputations where feasible and continued research should be conducted to improve these methods as new tools and techniques become available. Some rules-based adjustment may be necessary for some programs and income sources. For example, if program rules assign automatic eligibility for Medicaid to all TANF and SSI recipients, it could be logical to assign program receipt to all survey respondents who are known to participate in either of these two programs. In a similar vein, if there are school districts in which all students are deemed eligible for free school lunch, they should be assigned participation in free school lunch if they report that their children regularly eat school meals.

24. The Working Group recommends that the Census Bureau and the Bureau of Labor Statistics continue to research, and possibly implement, ways to reduce survey burden and improve the quality of resulting data through increased access and use of administrative data in surveys, including the ... CE.

25. The Working Group recommends funding support of the work to develop the new recommended measures, including funding to support BLS research the nature and construction of a potential consumption-based poverty measure and improve the CE program in support of improved poverty measurement. A proposal requesting \$7.1 million was included in the fiscal year 2021 President's Budget.

26. The Working Group recommends that the Bureau of Labor Statistics use the CE Interview Survey data to research and develop a consumption-based resource measure.
27. The Working Group recommends that the value of service flows from owner-occupied shelter and the value of the service flows from owned vehicles be included in the consumption resource measures.
28. The Working Group recommends that the CE Interview serve as the primary data source for the production of the consumption resource measures, with estimates produced at the state level.
29. The Working Group recommends that the current CE Interview Survey serve as the interim data source for the production of the consumption resource measures, with estimates produced at the Census Division level.
32. The Working Group recommends that by the time the proposed resource measures are ready to be published, BLS and the Census Bureau should work to identify an interim solution for each set of the measures for applying thresholds to produce a full poverty measure. BLS and the Census Bureau should consider input from experts (per the previous recommendation) as available to inform the applied methodology. The interim methodology applied need not be the final methodology chosen for application to the resource measures. The intention of this recommendation is to ensure the ability to publish poverty measures using the proposed resource measure recommendations.
33. The Working Group recommends that the BLS conduct a study of price indexes appropriate for use in updating thresholds that would be used in combination with consumption and income as defined in this report.
34. The Working Group recommends that an expert panel conduct a study of and make a recommendation regarding the application of equivalence scales that would be most appropriate for the income and consumption resource measures recommended in this report. In the interim, the Working Group recommends that for any resource measures produced an equivalence scale be applied that accounts for the potentially differing needs of adults and children and economies of scale.

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