Alternative Poverty Measurement for the U.S.: Focus on Supplemental Poverty Thresholds

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(co-authored with Marisa Gudrais)

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Disclaimer

- This presentation reports the results of research and analysis undertaken by researchers within the Bureau of Labor Statistics (BLS).

- Any views expressed are those of the authors and not necessarily those of the BLS.

- Results are preliminary and not to be quoted without authors’ permission.
National Academy of Sciences Panel on Poverty and Family Assistance


The official measure does not account for

- Higher standards and levels of living since 1965
- Provision of noncash benefits (food benefits, housing subsidies, energy assistance)
- Necessary expenses (taxes, work-related, health care)

Recommended Changes to Improve the Measure of Poverty in the U.S.

- Thresholds: Bureau of Labor Statistics (BLS)
- Resources and poverty statistics: Census Bureau
Supplemental Poverty Measures (SPM)

Interagency Technical Working Group - March 2, 2010

- Will not replace the official poverty measure
- Will not be used for resource allocation or program eligibility
- **Justification**: Evaluate impact of benefit programs on poverty
- Based on National Academy of Sciences expert panel recommendations *Measuring Poverty: A New Approach* (Citro and Michael, 1995)

**BLS: Research Experimental SPM Thresholds**

**Census Bureau: Resources and Poverty Statistics**
SPM and Concepts

- Poverty Concept, based on NAS recommendations
  - “...proposed thresholds, although developed in somewhat different ways, reflect concept of budget for consumption needs” (NAS Report, 1995, pp. 66-67) ...
  - “Hence, ... resources should add to money income the value of near-money in-kind benefits that are intended to support consumption” (pp. 67)

- Measurement concept for thresholds assumed
  - Expenditures are a good proxy for consumption (with the exception of owner shelter)

- Interagency Technical Working Group (ITWG) placed value on:
  - **Consistency** between threshold and resource definitions in terms of poverty concept
  - Data availability, simplicity in estimation, stability of the measure over time, and ease in explaining the methodology
Threshold Estimation... thus far...

- Food, clothing, shelter, and utilities (FCSU) expenditures
- Consumer Expenditure Interview Survey data: 5 years of data
- FCSU “expenditures” in constant year dollars
- Estimation sample: Consumer Units (CUs) with 2 children
- Reference sample: 2 adults with 2 children (3-parameter equivalence scale applied to +2 children FCSU expenditures)
- Rank CUs by their FCSU “expenditures”
  - Identify 33rd percentile represented by 30th to 36th percentile range
  - Produce means of FCSU and SU by housing status
  - Estimate thresholds by housing tenure

- Send to Census Bureau to derive other CU thresholds and make geographic adjustment
Housing Status Thresholds

- **Housing Status Groups, \( j \)**
  - Owners with mortgages
  - Owners without mortgages
  - Renters

- **SPM Threshold, \( j \)**

\[
= (1.2 \times FCSU_A) - SU_A + SU_j
\]

- \( FCSU_A, SU_A, SU_j \) are means within 30\(^{th}\) to 36\(^{th}\) percentile range of \( FCSU_A \) for reference CUs
In addition to owner-occupied housing...

Expenditures ≠ Consumption

when in-kind benefits not accounted for in spending
This Research

**Purpose**
- Highlight poverty concept underlying SPM and issue of consistency
- Examine options to value consumption needs when data are missing
- Produce 2014 SPM thresholds that reflect the “consumption” of FCSU, with exception of owner-occupied housing

**Contribution**
- Improved SPM thresholds that more nearly reflect consumption value of FCSU basic needs
- Improve overall SPM to better evaluate impact of in-kind benefit programs considered in resources
Poverty Concept: Economic Deprivation

**Thresholds represent “needs”**

* “Consumption Needs” defined as:
  - Food
  - Clothing
  - Shelter
  - Utilities
  - + “a little bit more” for personal care, non-work related transportation, etc.

**Resources meet “needs”**

- **Poverty Concept:** deprivation based on comparison of resources and consumption “needs”
- **Consumption “needs” proxied by spending (or expenditures)**
  - NAS Panel assumption: “CE expenditures include housing assistance subsidies (rent and utilities)” ... and “benefits from food stamps and other meals provided free” (paraphrase of NAS Report, 1995, pp. 393-394)
  - **BUT:** CE expenditures only account for food stamps or SNAP
SPM Thresholds and Housing Tenure Shares (2005 – 2015)

Two-Adult-Two-Child BLS-DPINR Research Experimental Supplemental Poverty Measure (SPM) Thresholds

<table>
<thead>
<tr>
<th>Year</th>
<th>Owners with Mortgages</th>
<th>S.E.</th>
<th>% Sample</th>
<th>Owners without Mortgages</th>
<th>S.E.</th>
<th>% Sample</th>
<th>Renters</th>
<th>S.E.</th>
<th>% Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>$21,064</td>
<td>$200</td>
<td>0.483</td>
<td>$17,643</td>
<td>$230</td>
<td>0.118</td>
<td>$20,641</td>
<td>$224</td>
<td>0.399</td>
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<td>2006</td>
<td>$22,010</td>
<td>$194</td>
<td>0.472</td>
<td>$18,301</td>
<td>$279</td>
<td>0.102</td>
<td>$21,278</td>
<td>$241</td>
<td>0.426</td>
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<tr>
<td>2007</td>
<td>$22,772</td>
<td>$171</td>
<td>0.5</td>
<td>$19,206</td>
<td>$299</td>
<td>0.086</td>
<td>$22,418</td>
<td>$249</td>
<td>0.414</td>
</tr>
<tr>
<td>2008</td>
<td>$24,259</td>
<td>$259</td>
<td>0.493</td>
<td>$20,386</td>
<td>$340</td>
<td>0.082</td>
<td>$23,472</td>
<td>$257</td>
<td>0.414</td>
</tr>
<tr>
<td>2009</td>
<td>$24,450</td>
<td>$242</td>
<td>0.489</td>
<td>$20,298</td>
<td>$340</td>
<td>0.084</td>
<td>$23,874</td>
<td>$345</td>
<td>0.425</td>
</tr>
<tr>
<td>2010</td>
<td>$25,018</td>
<td>$242</td>
<td>0.486</td>
<td>$20,590</td>
<td>$341</td>
<td>0.093</td>
<td>$24,391</td>
<td>$379</td>
<td>0.426</td>
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<tr>
<td>2011</td>
<td>$25,703</td>
<td>$323</td>
<td>0.459</td>
<td>$21,175</td>
<td>$298</td>
<td>0.11</td>
<td>$25,222</td>
<td>$378</td>
<td>0.421</td>
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<tr>
<td>2012</td>
<td>$25,784</td>
<td>$347</td>
<td>0.439</td>
<td>$21,400</td>
<td>$233</td>
<td>0.12</td>
<td>$25,105</td>
<td>$398</td>
<td>0.442</td>
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<tr>
<td>2013</td>
<td>$25,639</td>
<td>$368</td>
<td>0.438</td>
<td>$21,397</td>
<td>$337</td>
<td>0.115</td>
<td>$25,144</td>
<td>$400</td>
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<tr>
<td>2014</td>
<td>$25,844</td>
<td>$289</td>
<td>0.415</td>
<td>$21,380</td>
<td>$470</td>
<td>0.108</td>
<td>$25,460</td>
<td>$363</td>
<td>0.476</td>
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<tr>
<td>2015</td>
<td>$25,930</td>
<td>$345</td>
<td>0.371</td>
<td>$21,806</td>
<td>$417</td>
<td>0.119</td>
<td>$25,583</td>
<td>$282</td>
<td>0.51</td>
</tr>
</tbody>
</table>

* Based on out-of-pocket expenditures for food, clothing, shelter, and utilities. Shelter expenditures include those for mortgage principal payments.
SPM (and Official) Thresholds for Two Adults with Two Children: 2015

- Official: $24,036
- SPM Owners with mortgages: $25,930
- SPM Owners without mortgages: $21,806
- SPM Renters: $25,583

Source: http://stats.bls.gov/pir/spmhome.htm
Thresholds Distribution Shares by Component: 2015

- Owners with Mortgages
  - Food: 29%
  - Clothing: 4%
  - Shelter+Utilities: 51%
  - Other: 16%

- Owners without Mortgages
  - Food: 35%
  - Clothing: 4%
  - Shelter+Utilities: 41%
  - Other: 19%

- Renters
  - Food: 30%
  - Clothing: 4%
  - Shelter+Utilities: 50%
  - Other: 16%

- Send SPM thresholds and housing (shelter+utilities) shares to Census Bureau to derive other CU thresholds and make geographic adjustments.
Consistency in Poverty Concept: Resources to Meet FCSU and Evaluate In-Kind

Thresholds
Consumption Value of FCSU+ “little bit more”

Resources
- Housing & Energy Subsidies
- Other Food Subsidies
- With SNAP In-Kind Benefits
- Cash income
Missing Data Problem in Thresholds Leads to Inconsistency in Poverty Measure (current measure)

Thresholds

Resources

Expenditures for FCSU (including SNAP)+ “little bit more”

Inconsistent

Consistent

Housing & Energy Subsidies

Other Food Subsidies

With SNAP In-Kind Benefits

Cash income
Example of Subsidized Renter: the Case of Rent Spending in Thresholds

**Thresholds**

- 1/3 of market rent paid OOP Spending

**Renter Resources**

- Money income used to pay contract rent = 1/3 of market rent
- rental voucher covers 2/3 of market rent (not fungible)
Example of Subsidized Renter: Consumption Rent Value in Thresholds

Thresholds

1/3 of market rent paid OOP Spending

2/3 of market rent paid with voucher (in-kind benefit)

Renter Resources

Money income used to pay contract rent = 1/3 of market rent

rental voucher covers 2/3 of market rent (not fungible)
Challenges in Using
U.S. Consumer Expenditure Interview Survey for SPM

- Expenditures collected: out-of-pocket
- Limited data on Rental Assistance Programs
  - Indicator variables for rented living quarters
    - Is this house a public housing project, that is, it is owned by a local housing authority or other local public agency? (CE variable: pub_hous)
    - Are your housing costs lower because the Federal, State, or local government is paying part of the cost? (CE variable: govtcost)
  - Total rent payments for each of last 3 months (do not include direct payments by local, state, or federal agencies)
  - Expenditures for utilities
- No data on programs but data on potential participants
  - National School Lunch Program (NSLP)
  - Supplemental Nutrition Program for Women, Infants, and Children (WIC)
  - Low income Home Energy Assistance (LIHEAP)

- SNAP implicitly included in reported food expenditures

- ITWG stated ...
  - “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.” (March 2010)

FCSU = sum (food, clothing, shelter, utilities) at micro-level

<table>
<thead>
<tr>
<th>SPM Threshold = FCSU + little bit more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplemental Nutrition Assistance Program (SNAP)</td>
</tr>
<tr>
<td>Housing Subsidies</td>
</tr>
<tr>
<td>National School Lunch Program (NSLP)</td>
</tr>
<tr>
<td>Supplemental Nutrition Program for Women, Infants, and Children (WIC)</td>
</tr>
<tr>
<td>Low-Income Home Energy Assistance (LIHEAP)</td>
</tr>
</tbody>
</table>
ITWG Solution to CE Missing Data Problem

Thresholds

- FCSU Expenditures (Including SNAP)
- Other Food Subsidies
- Housing & Energy Subsidies

Resources

- Cash income
- In-Kind Benefits
- With SNAP
- Other Food Subsidies
- Housing & Energy Subsidies

Consistent
Options: Valuing “Needs” when Data Are Missing

- All Imputed
  - Impute NSLP, WIC, LIHEAP using CPS recipiency; CE rental program reported participation
  - Impute NSLP, WIC, LIHEAP; Rental Subsidy values (based on CE)

- Impute “better” measured
  - Impute NSLP using CPS recipiency; CE rental program reported participation
  - Impute NSLP; Rental Subsidy values (based on CE)

- Rental Impute - CE
  - CE rental program reported participation
  - Impute Rental Subsidy values (based on CE)

- “No” Imputes
  - Limit population to CUs without benefits
  - (exception NSPL paid)
  - Assumption: spending=consumption

- Rental Impute - CE Data Only
  - CE rental program reported participation
  - Impute Rental Subsidy values (based on CE imputed rents)

greater data availability & simplicity in estimation
# In-Kind Benefits, Expenditures, and Resources

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Form of Benefit</th>
<th>Value of Commodity or Service in CE Reported Expenditures?</th>
<th>SPM Resources Include</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNAP</td>
<td>EBT cash-value to CU</td>
<td>Yes, food expenditures=food consumption</td>
<td>yes</td>
</tr>
<tr>
<td>NSLP</td>
<td>Direct payment to school</td>
<td>No, &lt; consumption</td>
<td>yes</td>
</tr>
<tr>
<td>WIC</td>
<td>Voucher paper or EBT for commodities to CU</td>
<td>No, &lt; consumption</td>
<td>yes</td>
</tr>
<tr>
<td>LIHEAP</td>
<td>Direct payment to vendor</td>
<td>No, &lt; consumption</td>
<td>yes</td>
</tr>
<tr>
<td>Rental Subsidies</td>
<td>Landlord accepts voucher or CU lives in public housing</td>
<td>No, &lt; consumption</td>
<td>yes</td>
</tr>
</tbody>
</table>

EBT: Electronic benefit transfers  
Consumption value could be at recipient or market value
Impute for Missing In-Kind Benefit Program Participation: NSLP, WIC, & LIHEAP

- Impute recipiency to CE from U.S. Current Population Survey Annual Social and Economic Supplement (CPS ASEC) reported recipiency

- Data
  - Household level data with household and member characteristics
  - Same years as in CE: collected 2011-2015 refers to 2010-2014
  - CPS ASEC public use data accessed from NBER

- Method
  - Treat CE as having missing data so combine CPS and CE into one data file to impute from CPS to CE
  - SAS Proc MI
    - Logistic regression method when the classification variable has binary response (assuming monotone missing pattern for classification variable)
      - Renter with subsidy (=1)
      - Renter without subsidy (=2)
    - Draw random uniform error between 0 and 1 to impute recipiency= 1 or = 2 for each observation
Impute for Missing NSLP, WIC, & LIHEAP Benefits

- **NSLP: U.S. Department of Agriculture for 2010-2014**
  - Average per school lunch payment rates x # school days by state
    - Over 48 contiguous states plus Hawaii and Alaska
    - Rates for schools in which less than 60% of lunches served were free or reduced price for all but District of Columbia Louisiana, Mississippi, and New Mexico (60% or more with free or reduced, USDEd)
    - Number of school days by state from Department of Education, Schools & Staffing Survey (2011-2012 school year)
  - Different values (same values for commodities’ subsidy)
    - Free
    - Reduced
    - Student paid full price for lunch (=commodities subsidy)

- **WIC: U.S. Department of Agriculture for 2010-2014**
  - Monthly average values of monthly pre-rebate value per person, by state
  - Higher average infant rebate assigned to infants

- **LIHEAP: U.S. Department of Health and Human Services for 2010**
  - Average annual benefit levels per household per state
  - Benefits assigned based reference months in CE
    - Heating (October to March) – all states
    - Cooling (April to September) - not all states offer this benefit
Impute Missing Market Rents for Subsidized Renters

- Need market rent for consumption of rental services
  - Market rent=(rent paid + rental subsidy)
  - Do not need rental subsidies for thresholds (produce for data comparison)

- Market values assigned to subsidized rental units, approaches:
  1. Imputed market rents from CE data using 2-stage regression model
     - Stage 1: Logit regression of subsidized renters versus non-subsidized renters (CU sample selection)
     - Stage 2: Market rents paid controlling for sample selection, rental unit characteristics, and geography
  2. U.S. Department of Housing and Urban Development 2010-2014 Fair Market Rents (FMRs) matched to CE by Census tract and number of bedrooms
RESULTS
Results

- **U.S. Population Comparisons**
  - Aggregates
  - Program participation
  - Annual average benefits

- **SPM Threshold Estimation Sample (within FCSU 30th-36th percentiles of FCSU+IK) compared to all CUs**
  - Aggregate shares
  - Shares of in-kind benefits by participate type
  - Distribution of CUs with in-kind benefits by housing tenure group

- **Thresholds with and without in-kind benefits imputed**
## CE-Imputed In-Kind Benefits for U.S.: Aggregates

<table>
<thead>
<tr>
<th>Data Source</th>
<th>NSLP</th>
<th>WIC$^2$</th>
<th>LIHEAP</th>
<th>Rent Subsidies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FMR</td>
</tr>
<tr>
<td>CE Imputed Participation TH2014</td>
<td>$12.3</td>
<td>$3.6</td>
<td>$1.1</td>
<td>$29.8</td>
</tr>
<tr>
<td>(5 years of data) with ...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>free=$4.7</td>
<td>reduced=$5.7</td>
<td>paid=$1.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>children=$2.1</td>
<td>infants=$1.2</td>
<td>women=$0.3</td>
<td></td>
</tr>
<tr>
<td>CPS 2014</td>
<td>$12.0</td>
<td>$3.4</td>
<td>$1.8</td>
<td>$41.2</td>
</tr>
<tr>
<td>USDA 2014 (9 months Jan.-May, Sept.-Dec.)</td>
<td>$10.4-$10.5$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USDA Calendar Year 2014</td>
<td></td>
<td>$6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HHS FY2010 in 2014$</td>
<td></td>
<td></td>
<td>$3.2</td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td></td>
<td></td>
<td>$2.9</td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td>$0.3</td>
<td></td>
</tr>
<tr>
<td>HUD &amp; USDA 2014</td>
<td></td>
<td></td>
<td></td>
<td>$38.1</td>
</tr>
<tr>
<td><strong>H</strong>UD 2014</td>
<td></td>
<td></td>
<td></td>
<td>$37.0</td>
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<tr>
<td><strong>Public Housing</strong></td>
<td></td>
<td></td>
<td></td>
<td>$6.2</td>
</tr>
<tr>
<td><strong>Voucher and other</strong></td>
<td></td>
<td></td>
<td></td>
<td>$30.9</td>
</tr>
<tr>
<td><strong>USDA 2014</strong></td>
<td></td>
<td></td>
<td></td>
<td>$1.1</td>
</tr>
</tbody>
</table>

---

1 Lower value assumes all schools less than 60% free/reduced lunch; higher value assumes all school 60% or higher free/reduced lunch
2 WIC: CE estimates and USDA based on pre-rebate values for infant food; CPS values based on cost to USDA, not benefit value.
# CE-Imputed In-Kind Benefits for U.S.: CU/HH Participation

<table>
<thead>
<tr>
<th>Data Source</th>
<th>NSLP</th>
<th>WIC*</th>
<th>LIHEAP</th>
<th>Rent Subsidies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FMR</td>
</tr>
<tr>
<td>CE Imputed Participation (5 years of data) with ...</td>
<td>18.5%</td>
<td>2.9%</td>
<td>2.2%</td>
<td>3.4%</td>
</tr>
<tr>
<td>free=3.5% reduced=5.0% paid=10.1% children=1.9% infants=0.5% women=0.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPS 2014</td>
<td>17.2%</td>
<td>3.1%</td>
<td>3.4%</td>
<td>4.1%</td>
</tr>
<tr>
<td>HHS 2010**</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td></td>
<td></td>
<td>6.3%</td>
<td></td>
</tr>
<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td>0.8%</td>
<td></td>
</tr>
<tr>
<td>HUD 2014</td>
<td></td>
<td></td>
<td></td>
<td>3.9%</td>
</tr>
<tr>
<td>Public Housing</td>
<td></td>
<td></td>
<td></td>
<td>0.9%</td>
</tr>
<tr>
<td>Voucher and other</td>
<td></td>
<td></td>
<td></td>
<td>3.1%</td>
</tr>
<tr>
<td>USDA 2014</td>
<td></td>
<td></td>
<td></td>
<td>0.2%</td>
</tr>
</tbody>
</table>

*WIC: CE estimates based on pre-rebate values for infant food
**HHD 2010 latest data available; 34% of all housing units received heating and cooling assistance in FY2010.
## CE-Imputed In-Kind Benefits for U.S.: Annual Average Benefit per CU/HH

<table>
<thead>
<tr>
<th>Data Source</th>
<th>NSLP</th>
<th>WIC*</th>
<th>LIHEAP</th>
<th>Rent Subsidies</th>
<th>FMR</th>
<th>CE imputed rent</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE Imputed Participation (5 years of data) with ...</td>
<td>$535</td>
<td>$983</td>
<td>$390</td>
<td>$7,078</td>
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<td>$5,386</td>
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<tr>
<td></td>
<td>free=$1,098 reduced=$912 paid=$154</td>
<td>children=$904 infants=$2,052 women=$400</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>CPS 2014</td>
<td>$534</td>
<td>$828</td>
<td>$395</td>
<td>$7,643</td>
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<tr>
<td>HHS FY2010 in 2014</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heating</td>
<td></td>
<td></td>
<td>$406</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cooling</td>
<td></td>
<td></td>
<td>$332</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HUD 2014</strong></td>
<td></td>
<td></td>
<td></td>
<td>$7,992</td>
<td></td>
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</tr>
<tr>
<td><strong>Public Housing</strong></td>
<td></td>
<td></td>
<td>$5,784</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Voucher and other</strong></td>
<td></td>
<td></td>
<td>$9,500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>USDA 2014</strong></td>
<td></td>
<td></td>
<td>$4,148</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*WIC: CE estimates based on pre-rebate values for infant food.
Percent of 2014 Aggregate Dollars Using 5 Years of CE Data

For SPM Thresholds

IK=1.5%

Shelter & Utilities Only, 62.1%

Clothing, 4.8%

Food Only, 31.6%

All CUs

IK=4.1%

Shelter & Utilities Only, 56.3%

Clothing, 4.8%

Food Only, 34.8%

CUs in 30-36% of +2C

Aggregates based on CE imputed rent subsidies
Aggregate Shares of In-kind Benefits by Participant Type

**All CUs:**
IK = 1.5% of Aggregate

**CUs in 30-36th Percentile “2+2”:**
IK = 4.1% of Aggregate

Aggregates based on imputed rent subsidies
Distribution of CUs with In-kind Benefits

All CUs

CUs with 2 children in 30-36th
Going from FCSU to FCSU-IK in Thresholds
Density of FCSU and FCSU-IK for 2A+2C around “33rd” Percentile
2014 SPM Thresholds with and without In-Kind Imputed Benefits: 2 Adults with 2 Children (“2A+2C”)

Owners with mortgages

Renters

Owners without mortgages

<table>
<thead>
<tr>
<th>Income Level</th>
<th>Only Food Stamps</th>
<th>FCSU + NSLP + WIC + LIHEAP + Rent Subsidy (Imputed)</th>
<th>FCSU + NSLP + WIC + LIHEAP + Rent Subsidy (FMR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td>$5,000</td>
<td>$5,000</td>
<td>$21,380</td>
<td>$22,499</td>
</tr>
<tr>
<td>$10,000</td>
<td>$10,000</td>
<td>$22,300</td>
<td>$23,500</td>
</tr>
<tr>
<td>$15,000</td>
<td>$15,000</td>
<td>$23,500</td>
<td>$24,700</td>
</tr>
<tr>
<td>$20,000</td>
<td>$20,000</td>
<td>$24,700</td>
<td>$25,900</td>
</tr>
<tr>
<td>$25,000</td>
<td>$25,000</td>
<td>$25,900</td>
<td>$27,100</td>
</tr>
<tr>
<td>$30,000</td>
<td>$25,844</td>
<td>$27,100</td>
<td>$28,300</td>
</tr>
<tr>
<td>$35,000</td>
<td>$26,689</td>
<td>$28,300</td>
<td>$29,500</td>
</tr>
<tr>
<td>$40,000</td>
<td>$26,742</td>
<td>$29,500</td>
<td>$30,700</td>
</tr>
<tr>
<td>$45,000</td>
<td>$26,805</td>
<td>$30,700</td>
<td>$31,900</td>
</tr>
<tr>
<td>$50,000</td>
<td>$27,113</td>
<td>$31,900</td>
<td>$33,100</td>
</tr>
</tbody>
</table>
2014 SPM Thresholds with and without In-Kind Imputed Benefits: 2 Adults with 2 Children ("2A+2C")

Owners with mortgages

Renters

Owners without mortgages

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Owners with mortgages</th>
<th>Renters</th>
<th>Owners without mortgages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only Food Stamps</td>
<td>$25,844</td>
<td>$25,460</td>
<td>$21,380</td>
</tr>
<tr>
<td>FCSU + NSLP + WIC + LIHEAP + Rent Subsidy (Imputed)</td>
<td>$26,689</td>
<td>$26,348</td>
<td>$22,300</td>
</tr>
<tr>
<td>FCSU + NSLP + WIC + LIHEAP + Rent Subsidy (FMR)</td>
<td>$26,742</td>
<td>$26,576</td>
<td>$22,499</td>
</tr>
</tbody>
</table>
2014 Poverty Rates for Thresholds with and without In-Kind Imputed Benefits

www.census.gov/library/publications/2015/demo/p60-254.html
Summary

- Expenditures ≠ Consumption in the presence of in-kind benefits
- Examined impact of different options to deal with missing data in the CE, imputing participation (with exception of subsidized rental housing) and benefits
- Estimating consumption of FCSU, when benefits present, results in better measure of “needs”

Questions remain
- To what source should consumption values be compared?
  - Administrative data
  - CPS reports
  - Other CUs
- Should two thresholds for renters be produced (renters with and renters without subsidies) like the treatment of owners?
- Are benefit valuations sufficient to estimate consumption needs?
Conclusions

1. Spending ≠ Consumption in the presence of in-kind benefit participation
2. Estimating consumption of FCSU, when benefits present, results in better measure of “needs”
   • Improved SPM thresholds that reflect values of FCSU “purchased by/made available to” CUs (consumption for all but owner-occupied housing)
   • Consistency in threshold and resource concepts: resources to meet “needs”
3. Imputing for missing data in CE for in-kind benefit recipients -- one approach to value consumption
4. Questions remain
   • To what should consumption values be targeted?
     • Administrative data
     • CPS statistics
5. Continue research to address missing data problem in the CE
   • Explore possibility of 2 renter thresholds (with and without subsidies)
Contact Information

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Division of Price and Index Number Research/
Office of Prices and Living Conditions
http://stats.bls.gov/pir/spmhome.htm
202-691-6576
garnerthesia@bls.gov
Extra Slides
Figure 1: Poverty rates using two measures for total population and by age group: 2014

<table>
<thead>
<tr>
<th></th>
<th>Official**</th>
<th>SPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>All people</td>
<td>14.9</td>
<td>15.3</td>
</tr>
<tr>
<td>Under 18 years</td>
<td>21.5</td>
<td>16.7</td>
</tr>
<tr>
<td>18 to 64 years</td>
<td>13.5</td>
<td>15.0</td>
</tr>
<tr>
<td>65 years and older</td>
<td>10.0</td>
<td>14.4</td>
</tr>
</tbody>
</table>

**Includes unrelated individuals under the age of 15.
Southern Economics Association Annual Conference, November 2015.
## Expenditures, In-Kind Benefits, and Resources

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Form of Benefit</th>
<th>Value of Commodity or Service in CE Reported Expenditures?</th>
<th>Commodity or Service Value in Thresholds</th>
<th>In Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNAP</td>
<td>EBT cash-value to CU</td>
<td>yes, as food expenditures= full value</td>
<td>OOP</td>
<td>cash value</td>
</tr>
<tr>
<td>Housing Subsidies</td>
<td>Landlord accepts voucher or CU lives in public housing</td>
<td>&lt; full value</td>
<td>OOP+imputed benefit</td>
<td>imputed benefit</td>
</tr>
<tr>
<td>NSLP</td>
<td>Direct payment to school</td>
<td>&lt; full value</td>
<td>OOP+imputed benefit</td>
<td>imputed benefit</td>
</tr>
<tr>
<td>WIC</td>
<td>Voucher paper or EBT for commodities to CU (&amp; cash value voucher for fruits and veggies to CU)</td>
<td>&lt; full value yes, as food expenditure for WIC fruits and veggies</td>
<td>OOP+imputed benefit</td>
<td>imputed benefit (w/$cash voucher)</td>
</tr>
<tr>
<td>LIHEAP</td>
<td>Direct payment to vendor (&amp; check to CU to pay for “utilities” included in rent)</td>
<td>&lt; full value Yes, as expenditures for LIHEAP utilities</td>
<td>OOP+imputed benefit</td>
<td>imputed benefit (w/$check)</td>
</tr>
</tbody>
</table>
Solution: Thresholds and Resources Consistently Defined

Thresholds

Expenditures for FCSU (including SNAP)

Resources

With SNAP In-Kind Benefits

Cash income
### 2012 Thresholds Based on Full Estimation Sample vs. Restricted by Benefit Non-participation: 2A+2C

<table>
<thead>
<tr>
<th>Category</th>
<th>Full Estimation Sample</th>
<th>Restricted by Benefit Non-participation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPS Binary + FMR</td>
<td>$28,865</td>
<td>$28,349</td>
</tr>
<tr>
<td>CPS Binary + Two Stage Rent Imputation</td>
<td>$21,400</td>
<td>$21,784</td>
</tr>
<tr>
<td>Sample restricted: Drops all CUs with Free/Reduced Lunch, WIC, LIHEAP, and Rent Subsidies</td>
<td>$23,634</td>
<td>$23,634</td>
</tr>
</tbody>
</table>

- **$25,784**
- **$26,812**
- **$26,818**
- **$25,105**
- **$26,392**
- **$26,459**

- **$26,812**
- **$26,818**
- **$22,026**
- **$26,392**
- **$26,459**

- **$21,400**
- **$22,044**
- **$23,634**
- **$25,105**
- **$26,392**
- **$26,459**

- **$26,812**
- **$26,818**
- **$22,044**
- **$25,105**
- **$26,392**
- **$26,459**
Percent of 2012 Aggregate Dollars Using 5 Years of CE Data

- Shelter & Utilities Only, 62.01%
- Shelter & Utilities Only, 61.42%
- Shelter & Utilities Only, 56.54%
- Shelter & Utilities Only, 58.69%

- Clothing, 4.91%
- Clothing, 5.42%
- Clothing, 4.86%
- Clothing, 4.95%

- Food Only, 30.91%
- Food Only, 30.53%
- Food Only, 34.21%
- Food Only, 32.97%

- All CUs
- CUs with +2C
- CUs in 30-36% of +2C
- CUs in 47-53% of +2C

for SPM Thresholds
Consistency in Poverty Concept:
Resources to Meet FCSU but only Evaluate SNAP Impact

**Thresholds**
(closedly used)

- Expenditures for FCSU (including SNAP) + "little bit more"

**Resources**

- With SNAP In-Kind Benefits
- Cash income

Consistent
Logistic Regression Method for Monotone Missing Data

For a binary variable $Y_j$ with responses 1 and 2, a logistic regression model is fitted using observations with observed values for the imputed variable $Y_j$ and its covariates $X_1, X_2, \ldots, X_k$

$$\text{logit}(\mu_j) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \ldots + \beta_k x_k$$

where $X_1, X_2, \ldots, X_k$ are covariates for $Y_j$, $\mu_j = \Pr(y_j = 1|x_1, x_2, \ldots, x_k)$, and $\text{logit}(\mu_j) = \log(\mu_j/(1-\mu_j))$.

The fitted model includes the regression parameter estimates $\hat{\beta} = (\hat{\beta}_0, \hat{\beta}_1, \ldots, \hat{\beta}_k)$ and the associated covariance matrix $V_j$.

The following steps are used to generate imputed values for a binary variable $Y_j$ with responses 1 and 2:

1. New parameters $\beta_v = (\beta_{v0}, \beta_{v1}, \ldots, \beta_{vk})$ are drawn from the posterior predictive distribution of the parameters.

$$\beta_v = \hat{\beta} + V_{hj} \epsilon$$

where $V_{hj}$ is the upper triangular matrix in the Cholesky decomposition, $V_j = V_{hj} V_{hj}$, and $\epsilon$ is a vector of $k-1$ independent random normal variates.

2. For an observation with missing $Y_j$ and covariates $x_1, x_2, \ldots, x_k$, compute the expected probability that $y_j = 1$:

$$\nu_j = \frac{\exp(\mu_j)}{1 + \exp(\mu_j)}$$

where $\mu_j = \beta_{v0} - \beta_v x + \beta_{v1} x_2 + \ldots + \beta_{vk} x_k$.

3. Draw a random uniform variate, $u$, between 0 and 1. If the value of $u$ is less than $\nu_j$, impute $Y_j = 1$; otherwise impute $Y_j = 2$.

Density of FCSU and FCSU-IK for 2A+2C around the 33rd Percentile
Which CU Population’s Economic Behavior Reflects Consumption Needs?

CU Sample Population

- Non Benefit Cus, 88%
- Benefit Cus, 12%
2012 SPM Thresholds with and without In-Kind Imputed Benefits: 2 Adults with 2 Children ("2A+2C") (OLD RESULTS)

<table>
<thead>
<tr>
<th>Category</th>
<th>Only Food Stamps</th>
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<td>$26,459</td>
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### Aggregate Shares of In-kind Benefits by Participant Type

<table>
<thead>
<tr>
<th>All Cus: IK=1.8% of Aggregate</th>
<th>CUs in 30-36th Percentile “2+2”: 4.9% of Aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rent Subsidy</strong> 75%</td>
<td><strong>Rent Subsidy</strong> 55%</td>
</tr>
<tr>
<td><strong>NSLP Free</strong> 6%</td>
<td><strong>NSLP Free</strong> 12%</td>
</tr>
<tr>
<td><strong>NSLP Reduced</strong> 7%</td>
<td><strong>NSLP Reduced</strong> 12%</td>
</tr>
<tr>
<td><strong>NSLP Paid</strong> 3%</td>
<td><strong>NSLP Paid</strong> 5%</td>
</tr>
<tr>
<td><strong>WIC Children</strong> 4%</td>
<td><strong>WIC Children</strong> 10%</td>
</tr>
<tr>
<td><strong>WIC Infants</strong> 2%</td>
<td><strong>WIC Infants</strong> 2%</td>
</tr>
<tr>
<td><strong>WIC Pregnant</strong> 1%</td>
<td><strong>WIC Pregnant</strong> 1%</td>
</tr>
<tr>
<td><strong>LIHEAP</strong> 2%</td>
<td><strong>LIHEAP</strong> 2%</td>
</tr>
</tbody>
</table>

Aggregates based on CE imputed rent subsidies