Varying the Economies of Scale in Housing: Impact on Supplemental Poverty Measure Statistics

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Disclaimer

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

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

- Results are preliminary and not to be quoted without authors’ permission.
Why Three Thresholds?

- First, thresholds to be based only on food, clothing, shelter, utilities (FCSU), and multiplier for other basic goods and services like for personal care and nonwork related transportation.

- Second, since NAS Panel report was issued in 1995, became clear that significant number of low-income families own a home without a mortgage and therefore have quite low shelter expense requirements (see ITWG document, March 2010).

- Not taking this into account may overstate their poverty rates.

- Suggests the need to adjust SPM thresholds for housing status, distinguishing renters, owners with a mortgage, and owners without a mortgage.

- There would be THREE thresholds, NOT a single threshold for all.
Percent Distribution of Consumer Units by Before Tax Income and Housing Type: 2015

Motivation

- Supplemental Poverty Measure (SPM) assumes that all SPM resource units within each housing type (renter, owner with a mortgage, owner without a mortgage) devote the same share of their threshold to housing costs. This is important because...
  - Geographical adjustments applied to only the housing share of the threshold
  - Value of housing assistance benefits capped at no greater than the housing share of the threshold

- Concerns about underestimation of the value of housing benefits led to an investigation of this assumption...
  - Should the housing share vary by household size?
  - Should economies of scale in housing differ from those of other commodities in SPM thresholds?

- Bishop (2010) critique regarding holding economies of scale parameter constant and concern with implications for housing
Prior Research by Renwick and Mitchell on Alternative Housing Shares

- Changed housing shares to 70 percent for one person units; 60 percent for two person units
- Increased effect of housing subsidies on SPM rates.

Source: Renwick and Mitchell, 2015, using 2013 CPS ASEC.
Housing Status Thresholds and Adjustments

- FCSU expenditures for CUs with 2 children convert to FCSU for reference unit 2 adults with 2 children based on means within 30th to 36th percentile range of FCSU for reference CUs

- Thresholds produced for each housing tenure group, $j$
  - Owners with mortgages, Owners without mortgages, Renters

- For reference 2A+2C, shelter+utility shares of thresholds produced, $\alpha_j$

- Apply 3-parameter equivalence scale to derive $T_{j,s}$

- Finally geographically adjust housing part of threshold for cost of living, geo-adjusted threshold $j = p(\alpha_j T_{j,s}) + (1 - \alpha_j) T_{j,s}$
Research Experimental Supplemental Poverty Measure (SPM) Thresholds for Two Adults and Two Children, 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>Threshold amount</th>
<th>Housing Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPM Owners with mortgages</td>
<td>$25,930</td>
<td>0.505</td>
</tr>
<tr>
<td>SPM Owners without mortgages</td>
<td>$21,806</td>
<td>0.411</td>
</tr>
<tr>
<td>SPM Renters</td>
<td>$25,583</td>
<td>0.498</td>
</tr>
</tbody>
</table>

http://www.bls.gov/pir/spm/spm_chart1_2015data.htm
Housing Shares of SPM Thresholds for 2A+2C: 2015

Housing shares for the reference SPM unit (2 adults+2 children) used and impact two aspects of the SPM calculation:

- Geographic adjustment on only the housing share of the threshold
- Value of housing assistance capped using the housing portion of threshold minus renter payment (e.g., $12,663)

Restated: Concern with Holding Housing Shares Constant

- Housing is expected to exhibit greater economies of scale than food and clothing, so seems reasonable to examine using smaller or larger portions of thresholds for account for economies of scale differences.

- Portion of SPM thresholds subject to geographic adjustment would be larger for smaller families, thereby increasing thresholds for those living in areas with housing costs greater than national median and decreasing for those in lower housing costs areas.

- Because value of housing subsidy capped, increase value of housing subsidies for some smaller families that could reduce their poverty rates.
Options to Deal with Greater Economies of Scale in Housing

OPTION 1
- Apply 3-parameter equivalence scale for other household sizes and types
- But now, housing share varies also by consumer unit size

\[ T_{g,\theta,j,s} = p_g(\theta_{j,s} T_{j,s}) + (1-\theta_{j,s})T_{j,s} \]
- New \( B_{j,s} \) from survey data

OPTION 2
- Apply housing equivalence scale to housing part of 2A+2C threshold
- Apply F+C equivalence scale to F+C part of 2A+2C threshold
- For example, for 1-person thresholds, with \( N=4 \):

\[ T_{g,j,1} = p_g \left( \frac{\alpha_j T_{j,2+2}}{N^h} + \frac{(1-\alpha_j)T_{j,2+2}}{N^f} \right) \]
- Estimate new scales parameters, \( h \) and \( f \), using survey data
Alternative Estimates of Housing Shares

Figure 1. Total Population Housing Expenditures as a Percent of Income

- Gross Rent as a Percentage of Household Income
- Selected Monthly Owners Costs as a Percentage of Household Income - Mortgage
- Selected Monthly Owners Costs as a Percentage of Household Income - No Mortgage

Source: 2014 American Community Survey Five Year Data. For more information, see census.gov/acs.

Figure 2. Housing Expenditures as a Percent of Income - Households with Income Less than 200 percent of Official Poverty

- Gross Rent as a Percentage of Household Income
- Selected Monthly Owners Costs as a Percentage of Household Income - Mortgage
- Selected Monthly Owners Costs as a Percentage of Household Income - No Mortgage

Source: 2014 American Community Survey Five Year Data. For more information, see census.gov/acs.
Comparing ACS to CE Estimates

Figure 2. Housing Expenditures as a Percent of Income - Households with Income Less than 200 percent of Official Poverty

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Source: 2014 American Community Survey Five Year Data. For more information, see census.gov/acs.

Figure 3. Housing Expenditures as a Percent of the Sum of Food, Clothing, Shelter, Utilities (FCSU), and Other Basic Needs (20%) Expenditures

- Renters
- Owners with Mortgage
- Owners without a Mortgage

Source: Quarterly Consumer Expenditure Survey, all consumer units participating In 2008Q2-2013Q1
Regression-Based Equivalence Scales

Basic model:

\[ \ln(Exp) = \beta_0 + \beta_1 \ln(Y) - \beta_2 \ln(N) + ... + \varepsilon \]

Rearranging predicted values yields an expression for log income share devoted to, for example, housing.

\[ \ln(SHARE) = \beta_0 + (\beta_1 - 1) \ln(Y) - \beta_2 \ln(N) + ... \]

All else constant, a consumer unit with \( Y_N \) will be equally well-off as a single person with \( Y_1 \) if:

\[ \beta_0 + (\beta_1 - 1) \ln(Y_1) + ... = \beta_0 + (\beta_1 - 1) \ln(Y_N) - \beta_2 \ln(N) + ... \]

Cancelling and rearranging terms yields the single-parameter approximation:

\[ \frac{Y_N}{Y_1} = N^{\frac{\beta_2}{\beta_1 - 1}} \]

- Run separately for housing and for food+clothing
- 5 years of CE Interview data, expenditures in constant dollars
### Consumer Unit Size Equivalence Scale Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Housing</th>
<th>Food+Clothing</th>
<th>Housing</th>
<th>Food+Clothing</th>
<th>Housing</th>
<th>Food+Clothing</th>
<th>Housing</th>
<th>Food+Clothing</th>
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</thead>
<tbody>
<tr>
<td>Source: Bureau of Labor Statistics, Garner’s analysis of internal CE Interview data from 2008Q2 through 2013Q1, four quarters of data for each consumer unit. Three parameter scale based on: 1 person=1 adult, 2 people=1 adult+1 child, 3 people=2 adults+1 child, 4 people=2 adults+2 children, 5 people=2 adults+3 children, and 6 people=3 adults+3 children.</td>
<td>0.569</td>
<td>0.589</td>
<td>0.118</td>
<td>0.571</td>
<td>0.120</td>
<td>0.665</td>
<td>0.286</td>
<td>0.582</td>
</tr>
</tbody>
</table>
2015 SPM Thresholds: Varying Equivalence Scales

Three-Parameter Scale

Single Parameter for All CUs

Single Parameter for Housing Type Separately

Source: Bureau of Labor Statistics, Garner’s analysis of internal CE Interview data from 2008Q2 through 2013Q1, four quarters of data for each consumer unit.
Housing Share of SPM Thresholds by Methodology before Geo Adjustment

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</thead>
<tbody>
<tr>
<td>SPM</td>
<td>49.8%</td>
<td>49.8%</td>
<td>49.8%</td>
<td>49.8%</td>
<td>49.8%</td>
<td>49.8%</td>
</tr>
<tr>
<td>ACS</td>
<td>59.3%</td>
<td>52.8%</td>
<td>52.8%</td>
<td>49.8%</td>
<td>47.3%</td>
<td>45.8%</td>
</tr>
<tr>
<td>CE</td>
<td>53.3%</td>
<td>51.8%</td>
<td>50.3%</td>
<td>49.8%</td>
<td>48.3%</td>
<td>47.8%</td>
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<tr>
<td>SP for All Units</td>
<td>59.2%</td>
<td>54.5%</td>
<td>51.8%</td>
<td>49.8%</td>
<td>48.3%</td>
<td>47.0%</td>
</tr>
<tr>
<td>SP by Housing Type</td>
<td>59.9%</td>
<td>54.9%</td>
<td>51.9%</td>
<td>49.8%</td>
<td>48.1%</td>
<td>46.8%</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations based on ACS 2014 5 year data, shares alternative equivalence scales derived by Garner from CE data.
Monthly Average Housing Expenditures Implicit in SPM Thresholds for Washington DC Metro Area Renters: 1 Person vs 6 People

One Person

- SPM: $793
- ACS Shares: $944
- CE Shares: $841
- Garner1: $1,104
- Garner2: $1,152

Six Person

- SPM: $2,235
- ACS Shares: $2,056
- CE Shares: $1,946
- Garner1: $1,922
- Garner2: $1,922
Overall SPM Poverty Rates: 2015

Poverty Rates by Consumer Unit Size: 2015

Poverty Rates by Consumer Unit
Age: 2015

Poverty Rates by Place of Residence: 2015

Consumer Units with Housing Subsidy: 2015

Marginal Impact of Housing Subsidies on Poverty Rates: 2015

Conclusions and Future Research

- Impact on poverty rates
  - Little overall
  - Adjustments through equivalence scales impact rates
    - Consumer unit size—higher for smaller sizes and lower for larger
    - Elderly rates higher

- Impact on housing subsidies and result
  - Adjustments based on equivalence scales
    - Reduce percentage with $0 subsidy
    - Reduce percentage with capped subsidy
  - Little marginal impact of housing subsidies on poverty rates

- Future
  - Develop a methodology to validate the existing and/or proposed equivalence scales, consider adults and children
  - Making adjustments for differences in prices for FCSU at local level and interarea before producing reference unit thresholds
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