

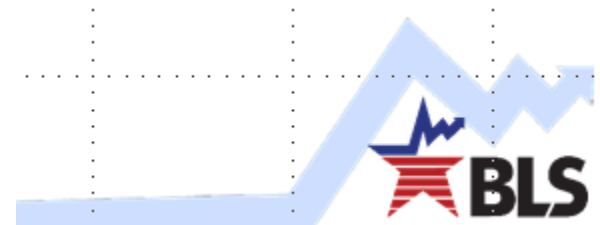
# Varying the Economies of Scale in Housing: Impact on Supplemental Poverty Measure Statistics

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# Disclaimer

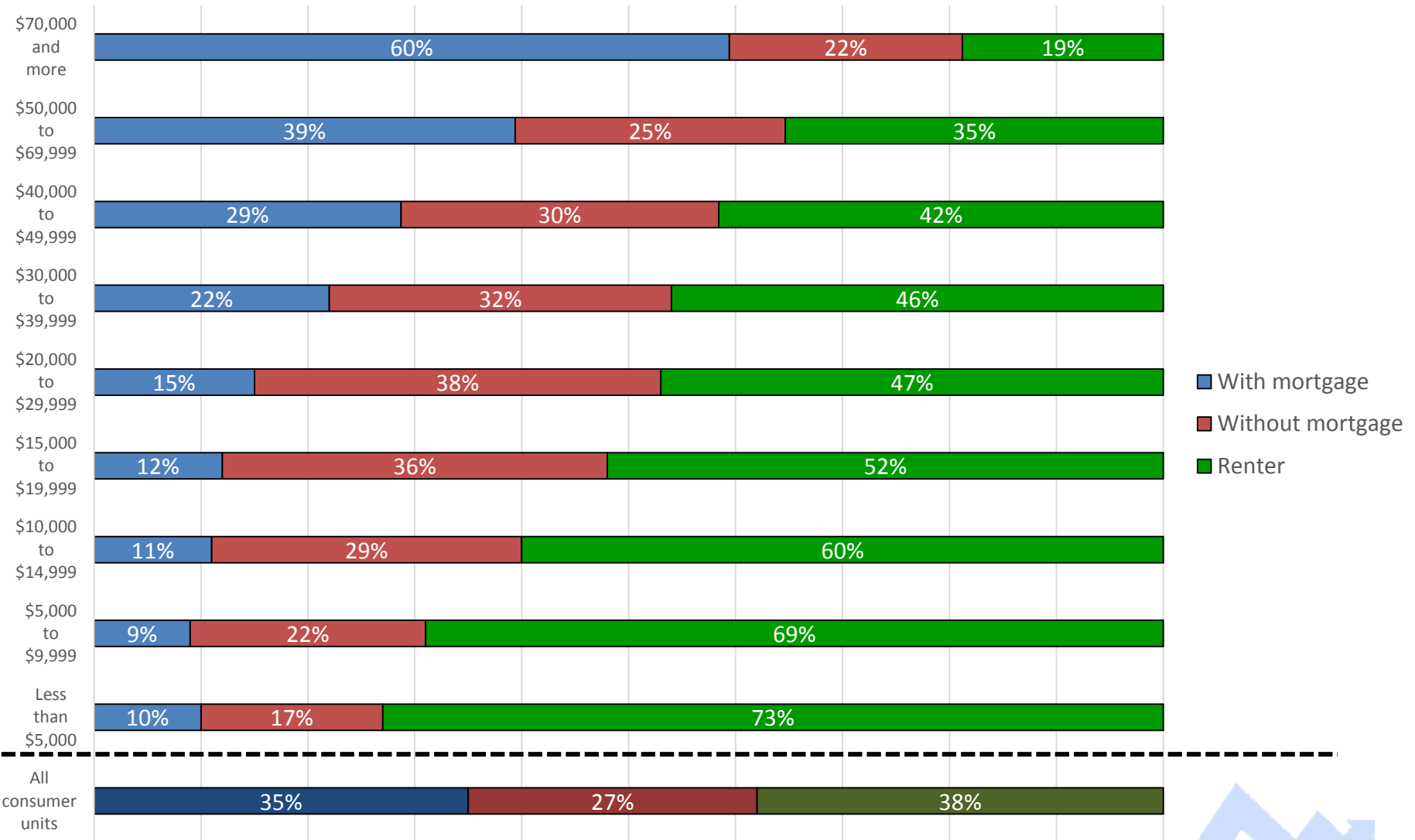
- This presentation reports the results of research and analysis undertaken by researchers within the Bureau of the Census (Census) and Bureau of Labor Statistics (BLS).
- Any views expressed are those of the authors and not necessarily those of the Census or BLS.
- Results are preliminary and not to 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



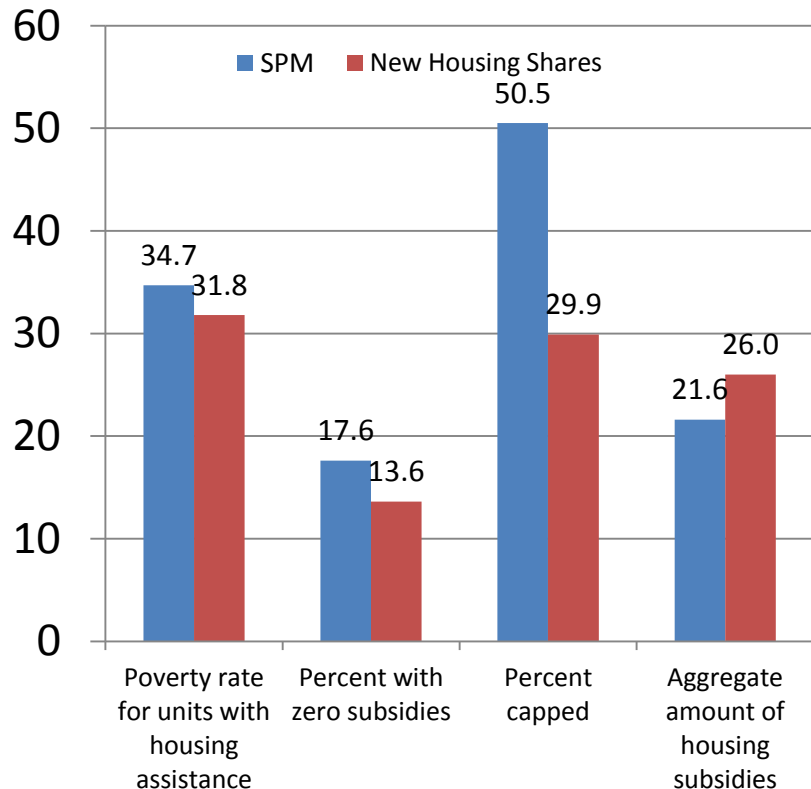
Source: Bureau of Labor Statistics, Prepublication Table 1202. *Income before taxes: Annual means, standard errors, coefficients of variation, and quarterly percents reporting*, Consumer Expenditure Interview Survey, 2015.



# 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 threshold
  - Value of housing assistance benefits capped at no greater than 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



Source: Renwick and Mitchell, 2015, using 2013 CPS ASEC.

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

# 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 30<sup>th</sup> to 36<sup>th</sup> 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  $_j = p(\alpha_j T_{j,s}) + (1 - \alpha_j) T_{j,s}$



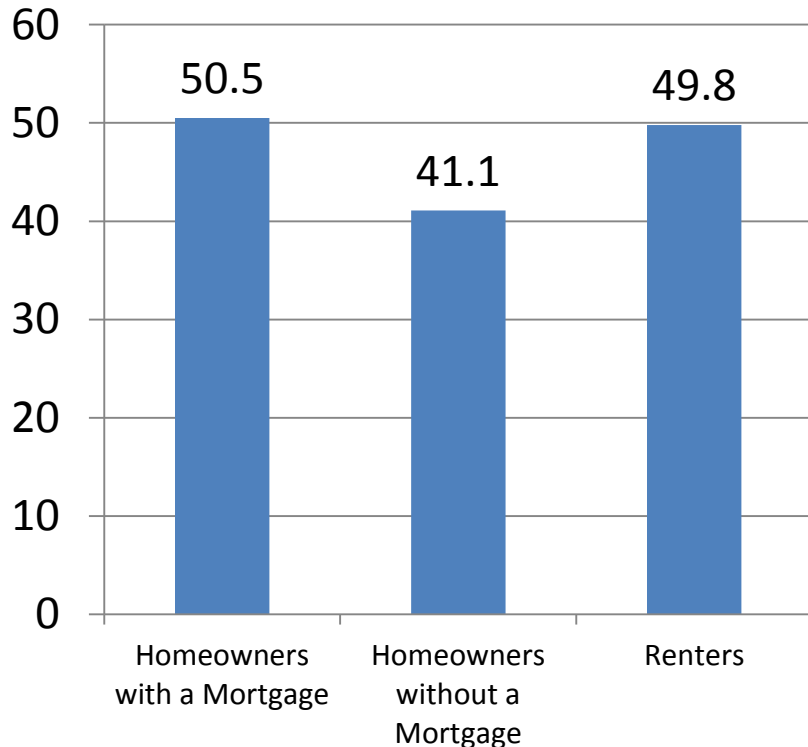
# Research Experimental Supplemental Poverty Measure (SPM) Thresholds for Two Adults and Two Children, 2015

	Threshold amount	Housing Share
SPM Owners with mortgages	\$25,930	0.505
SPM Owners without mortgages	\$21,806	0.411
SPM Renters	\$25,583	0.498

[http://www.bls.gov/pir/spm/spm\\_chart1\\_2015data.htm](http://www.bls.gov/pir/spm/spm_chart1_2015data.htm)



# Housing Shares of SPM Thresholds for 2A+2C: 2015



Source: Bureau of Labor Statistics, Division of Price and Index Number Research, September 2016.

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

$$T_{g,\beta_{j,s}} = p_g(\beta_{j,s}T_{j,s}) + (1 - \beta_{j,s})T_{j,s}$$

- New  $\beta_{j,s}$  from survey data

## OPTION 2

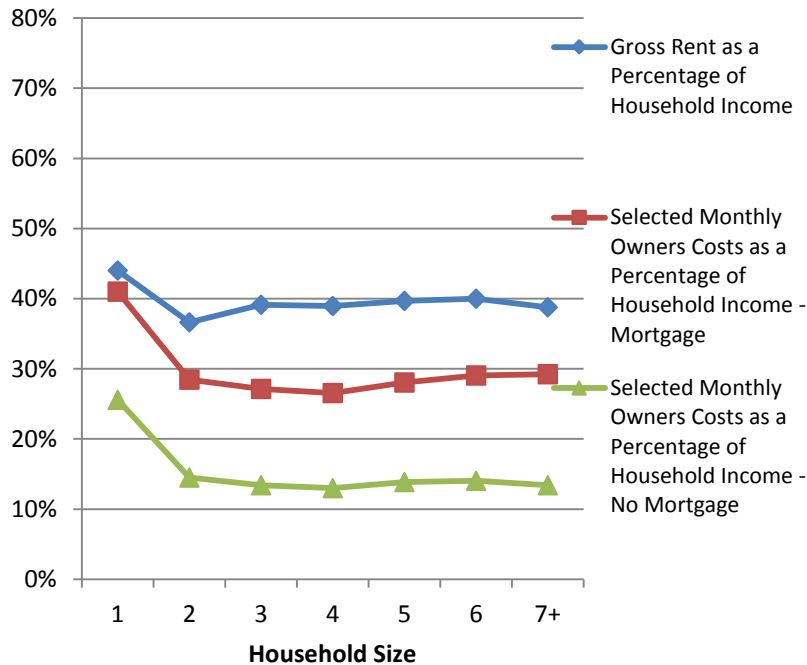
- Apply housing equivalence scale to housing part of 2A+2C threshold
- Apply F+C equivalence scale to F+C part of 2A+2C threshold
- For example, for 1-person thresholds, with N=4:

$$T_{g,j,1} = p_g \frac{(\alpha_j T_{j,2+2})}{Nh} + \frac{((1-\alpha_j)T_{j,2+2})}{Nf}$$

- Estimate new scales parameters,  $h$  and  $f$ , using survey data

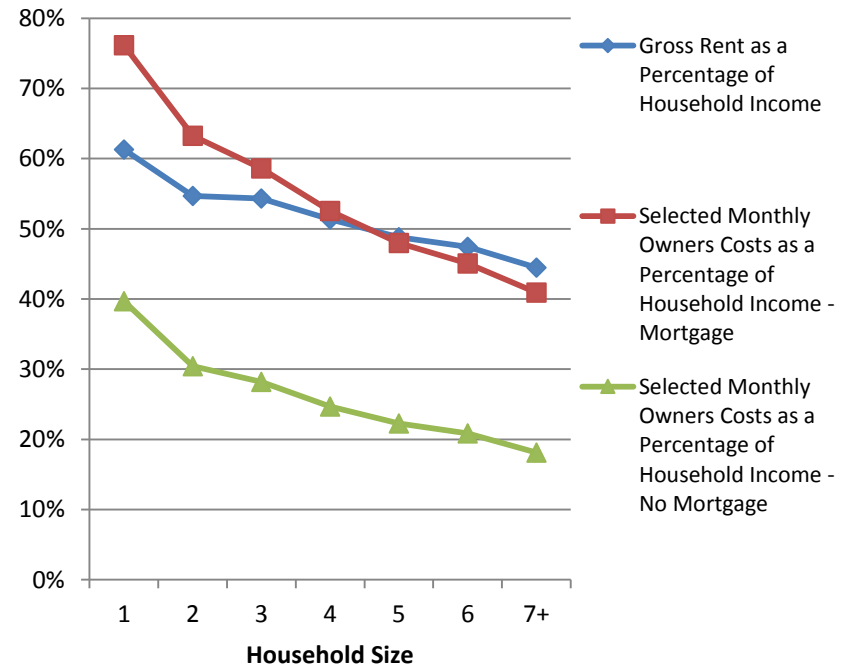
# Alternative Estimates of Housing Shares

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



Source: 2014 American Community Survey Five Year Data.  
For more information, see [census.gov/acs](http://census.gov/acs).

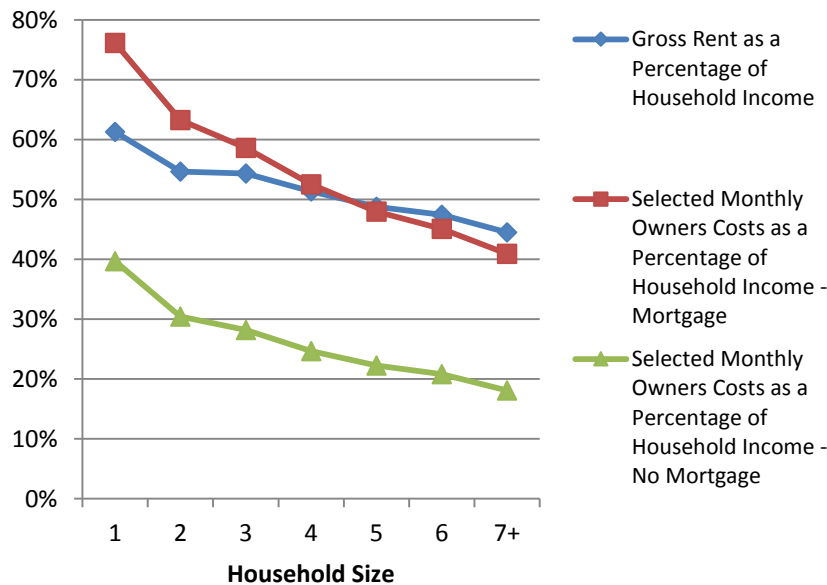
**Figure 2. Housing Expenditures as a Percent of Income - Households with Income Less than 200 percent of Official Poverty**



Source: 2014 American Community Survey Five Year Data.  
For more information, see [census.gov/acs](http://census.gov/acs).

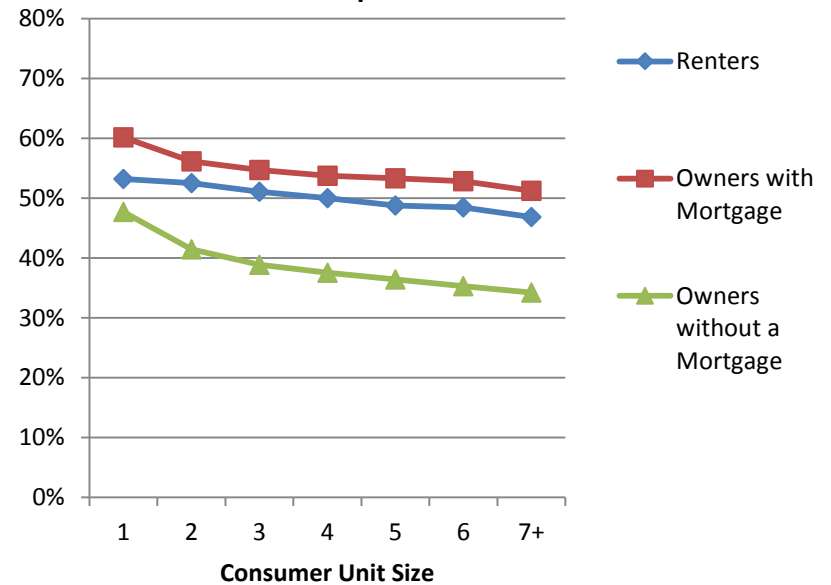
# Comparing ACS to CE Estimates

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



Source: 2014 American Community Survey Five Year Data.  
For more information, see [census.gov/acs](http://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**



Source: Quarterly Consumer Expenditure Survey, all consumer units participating in 2008Q2-2013Q1

# Regression-Based Equivalence Scales

Basic model:

$$\ln Exp = \beta_0 + \beta_1 \ln Y - \beta_2 \ln N + \dots + \varepsilon$$

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

$$\ln SHARE = \beta_0 + (\beta_1 - 1) \ln Y - \beta_2 \ln N + \dots$$

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

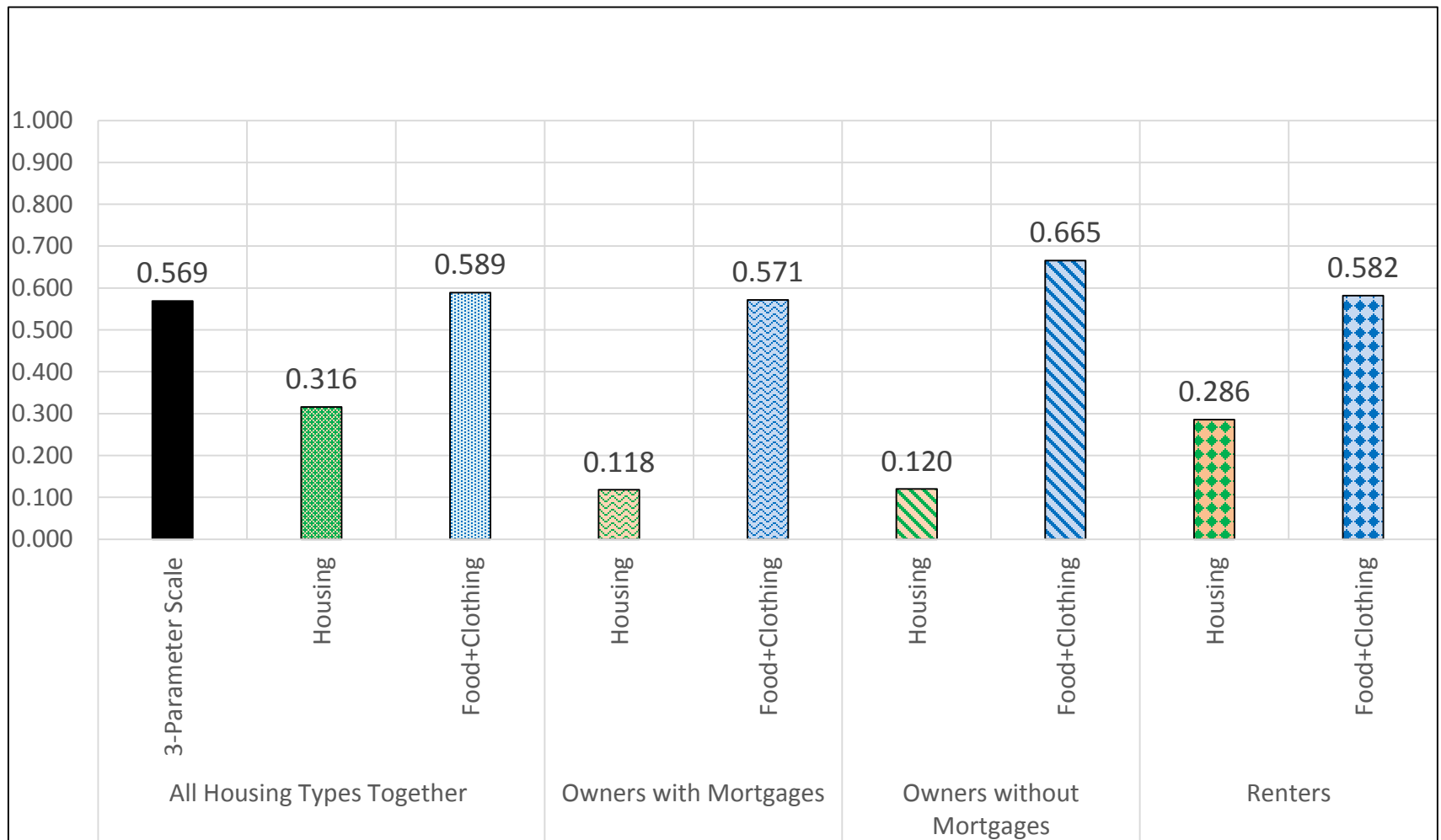
$$\beta_0 + (\beta_1 - 1) \ln Y_1 + \dots = \beta_0 + (\beta_1 - 1) \ln Y_N - \beta_2 \ln N + \dots$$

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
- Control variables: urban/rural, region (NE,S,MW,W), time (2008, 2009, 2010, 2011, 2012)

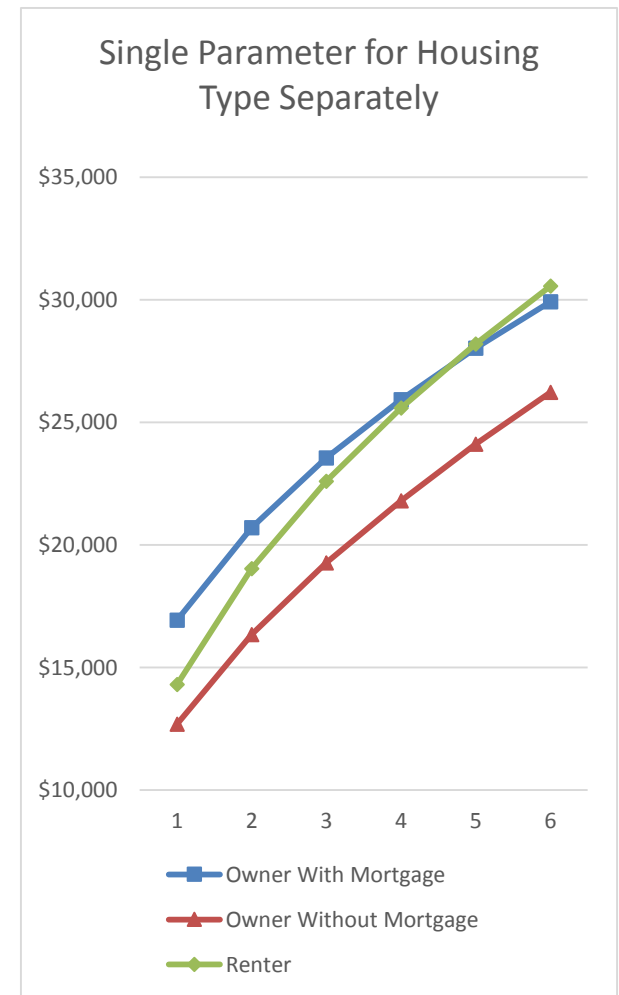
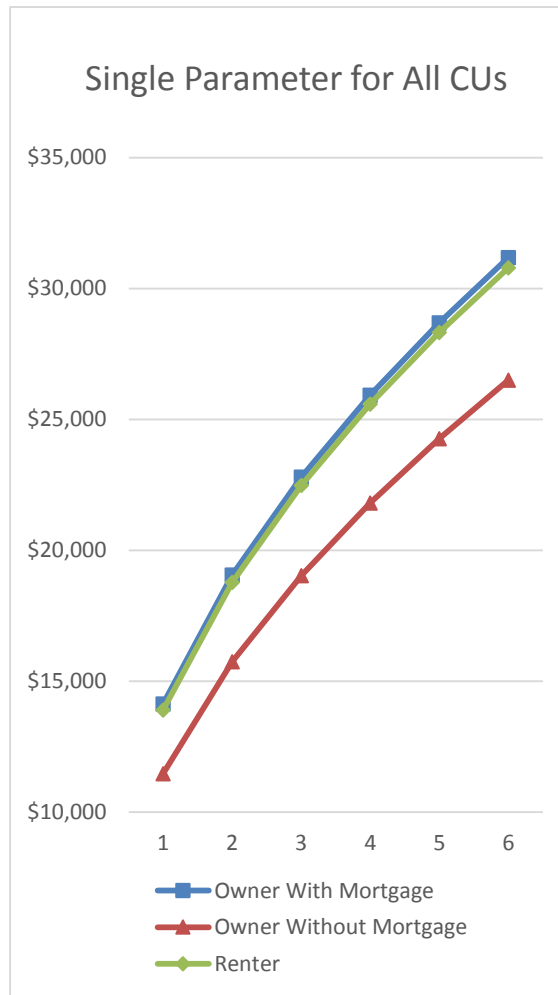
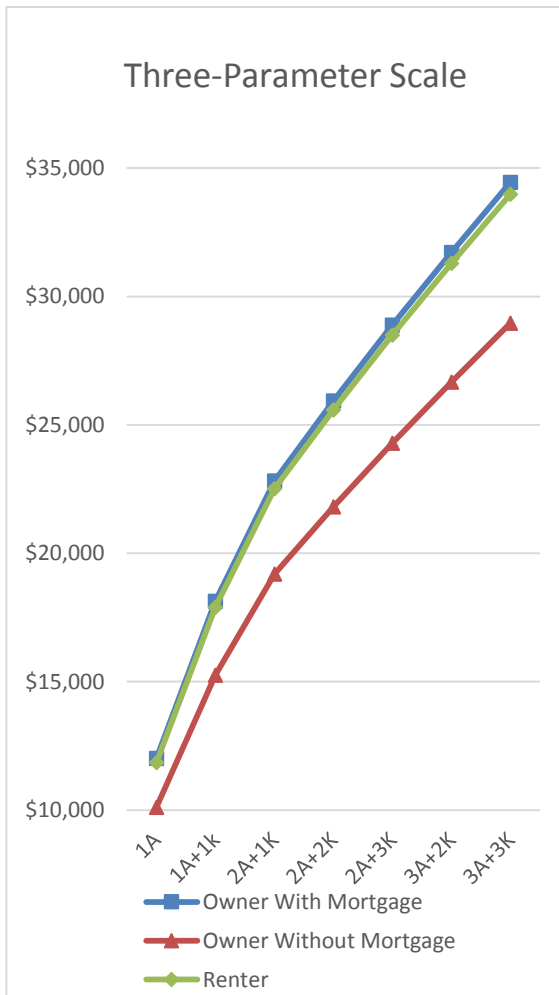
# Consumer Unit Size Equivalence Scale Parameters



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=1adult, 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.



# 2015 SPM Thresholds: Varying Equivalence Scales

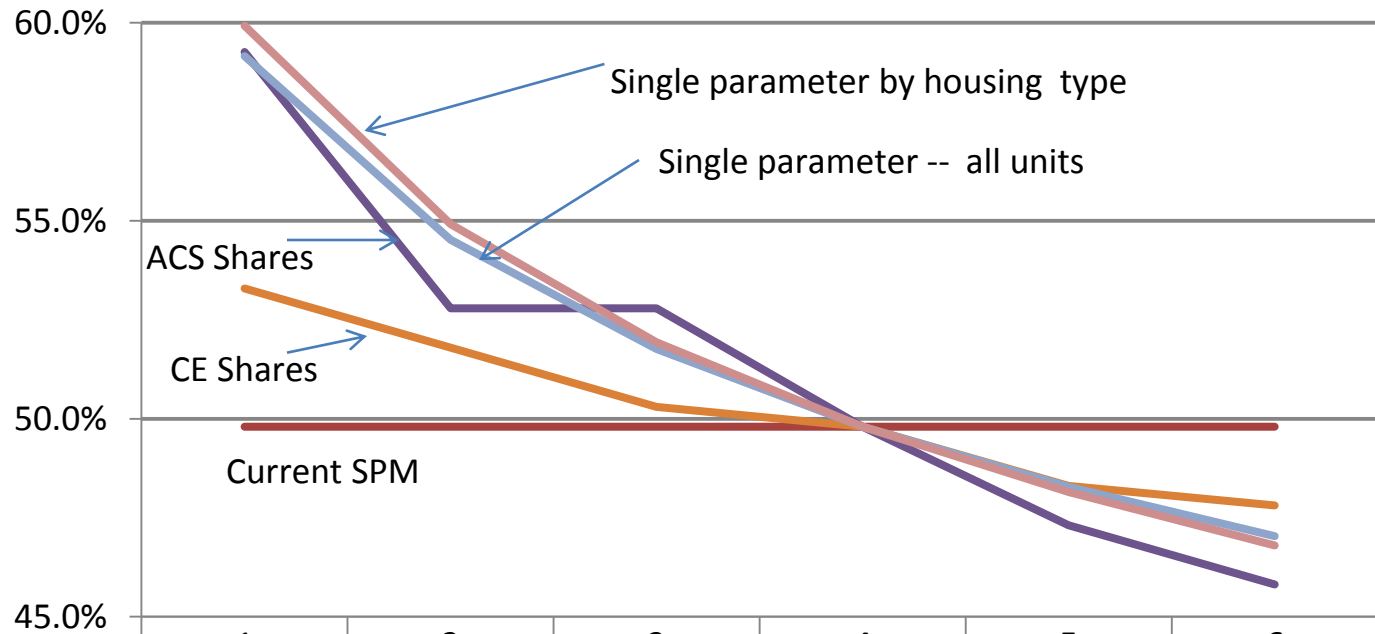


Source: Bureau of Labor Statistics, Garner's analysis of internal CE Interview data from 2008Q2 through 2013Q1, four quarters of data for each consumer unit.



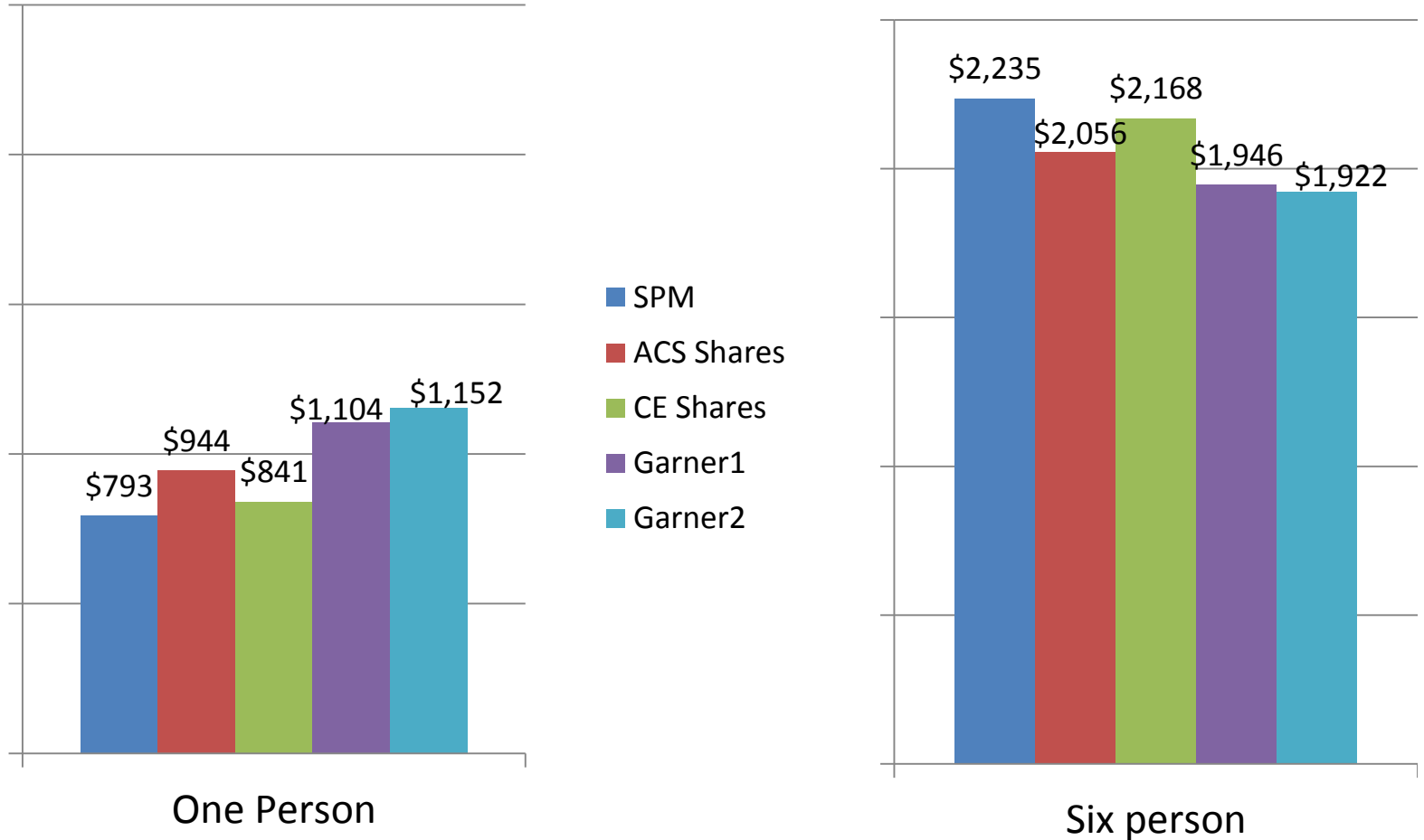


# Housing Share of SPM Thresholds by Methodology before Geo Adjustment

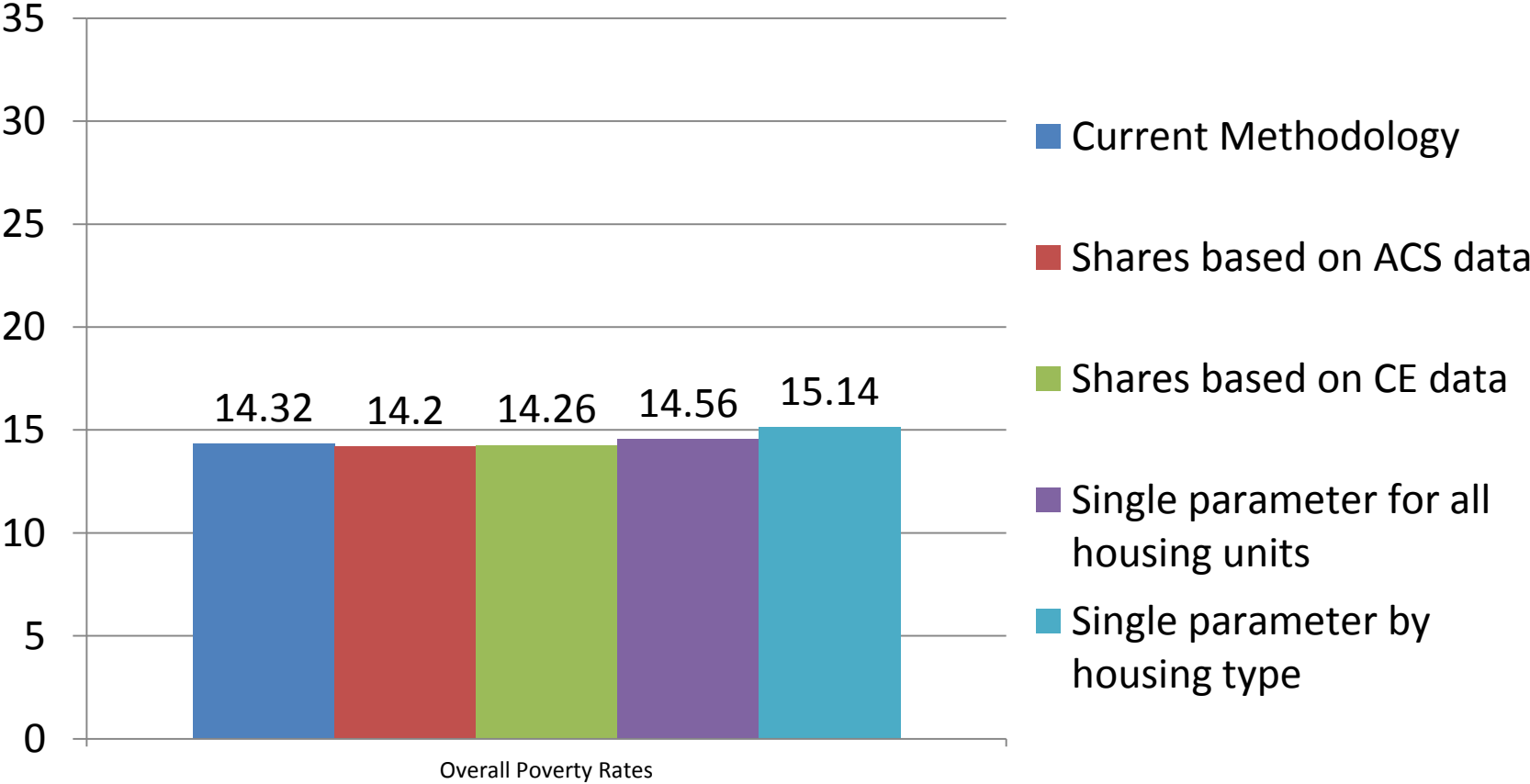


	1	2	3	4	5	6
SPM	49.8%	49.8%	49.8%	49.8%	49.8%	49.8%
ACS	59.3%	52.8%	52.8%	49.8%	47.3%	45.8%
CE	53.3%	51.8%	50.3%	49.8%	48.3%	47.8%
SP for All Units	59.2%	54.5%	51.8%	49.8%	48.3%	47.0%
SP by Housing Type	59.9%	54.9%	51.9%	49.8%	48.1%	46.8%

# Monthly Average Housing Expenditures Implicit in SPM Thresholds for Washington DC Metro Area Renters: 1 Person vs 6 People

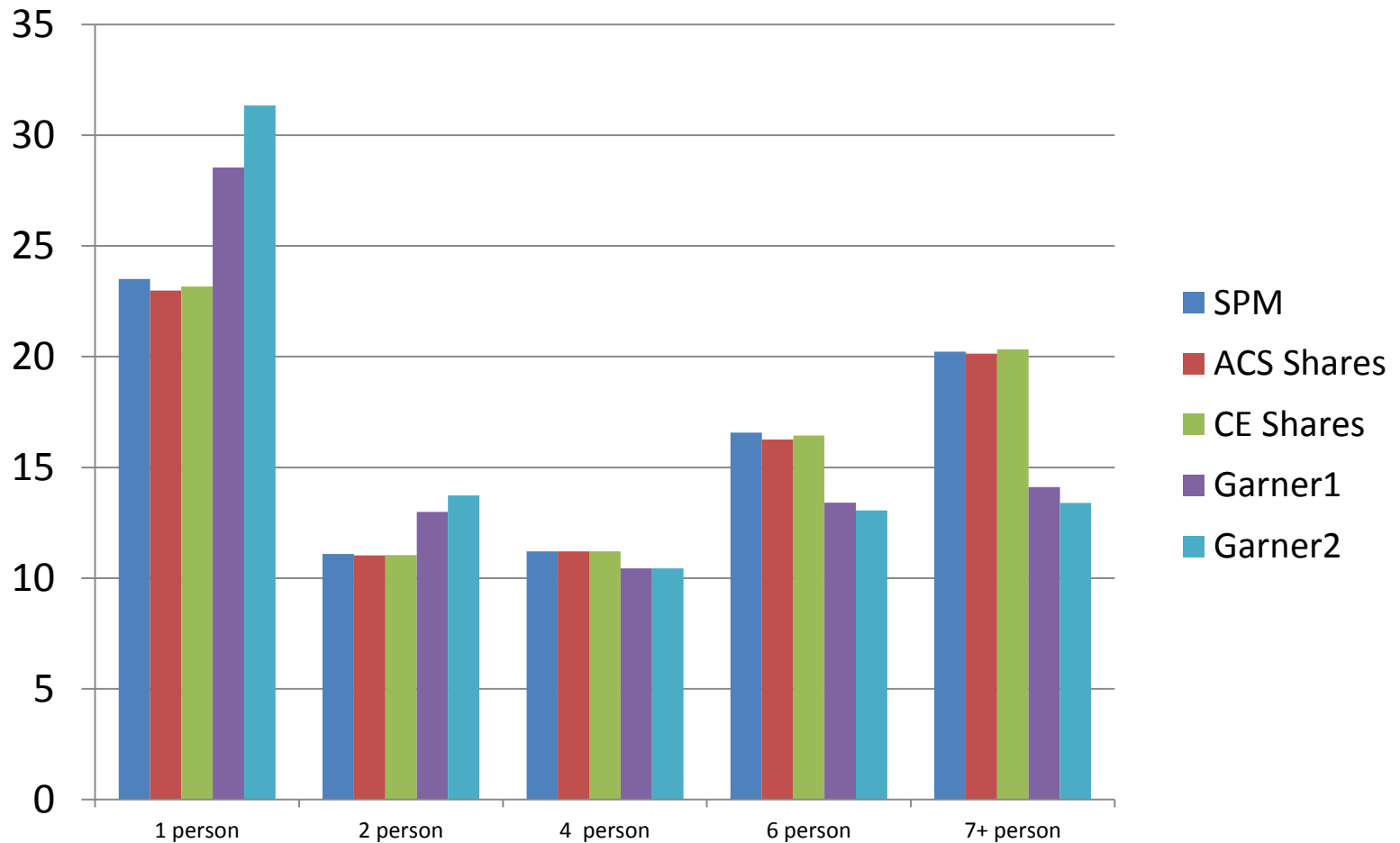


# Overall SPM Poverty Rates:2015



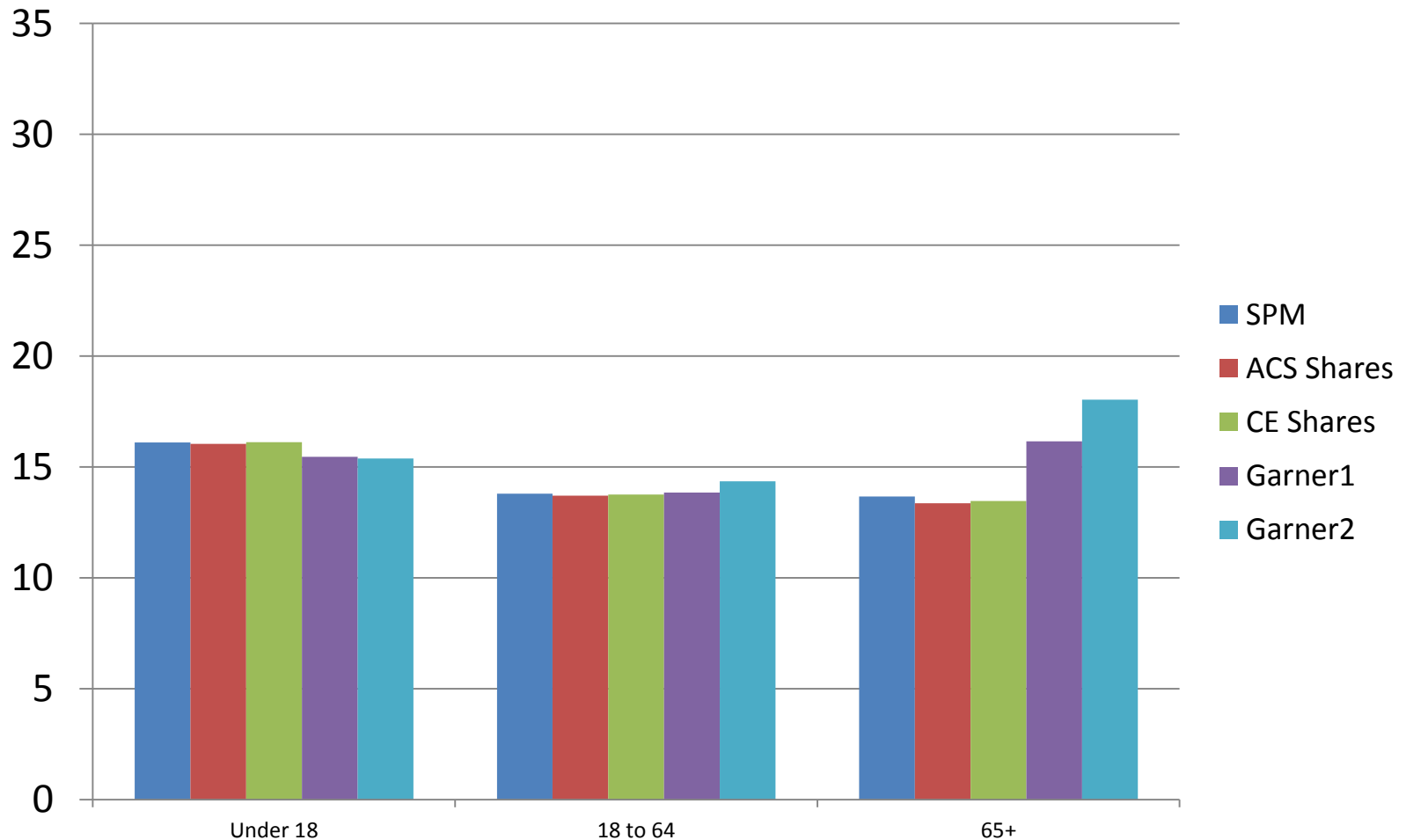
Source: 2015 Current Population Survey Annual Social and Economic Supplement.

# Poverty Rates by Consumer Unit Size: 2015

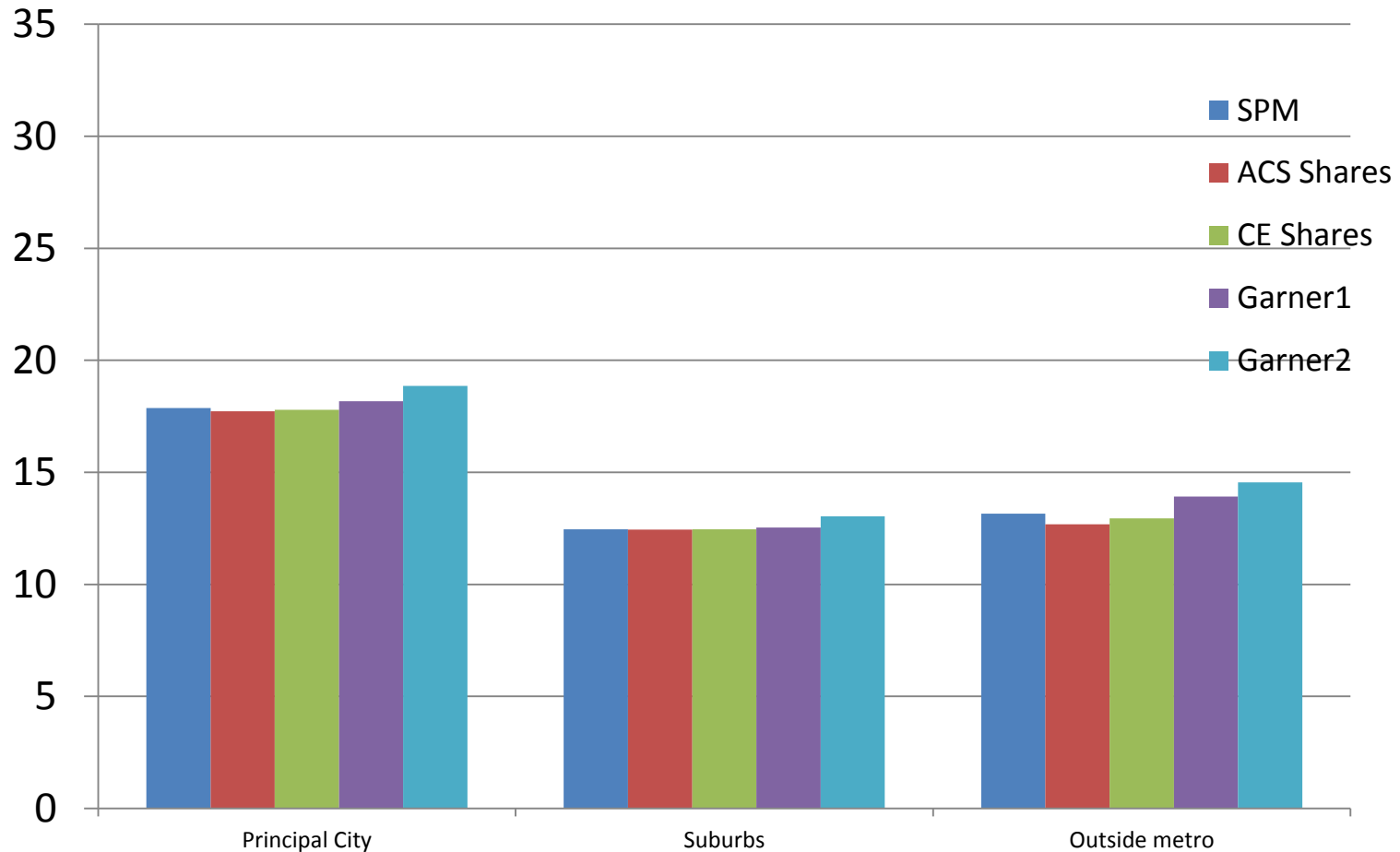


Source: 2015 Current Population Survey Annual Social and Economic Supplement.

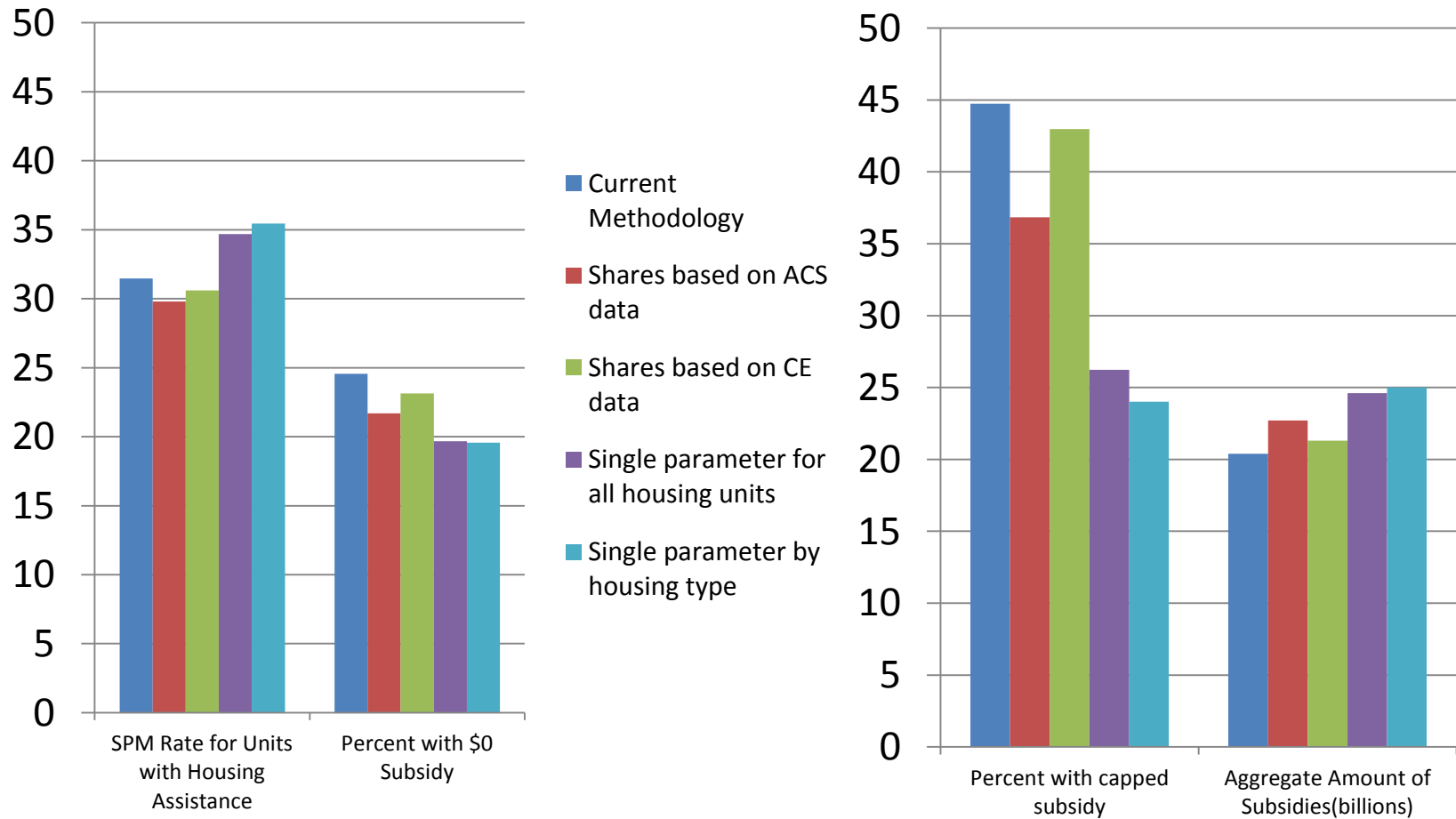
# Poverty Rates by Consumer Unit Age: 2015



# Poverty Rates by Place of Residence:2015

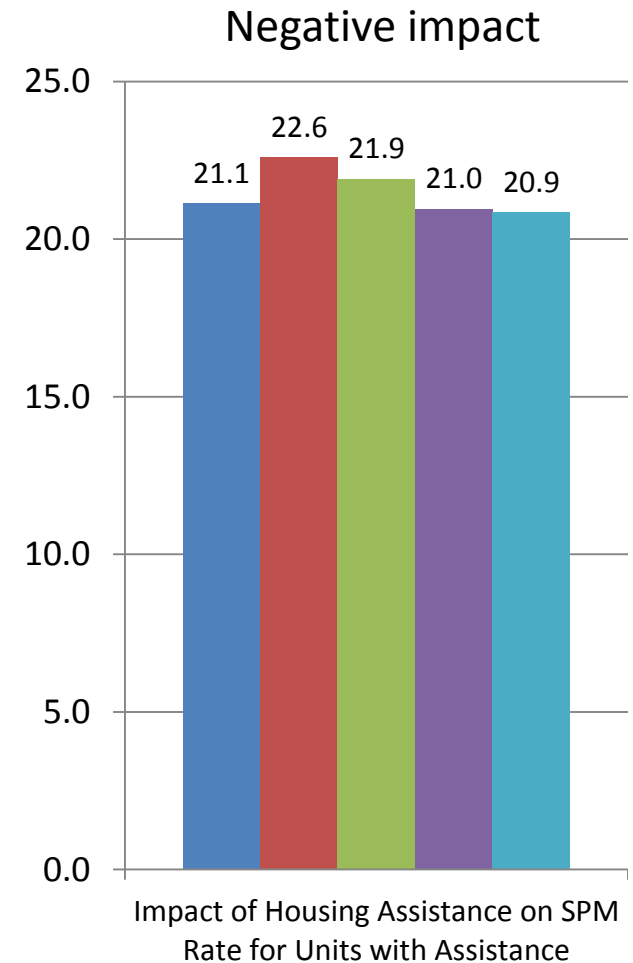
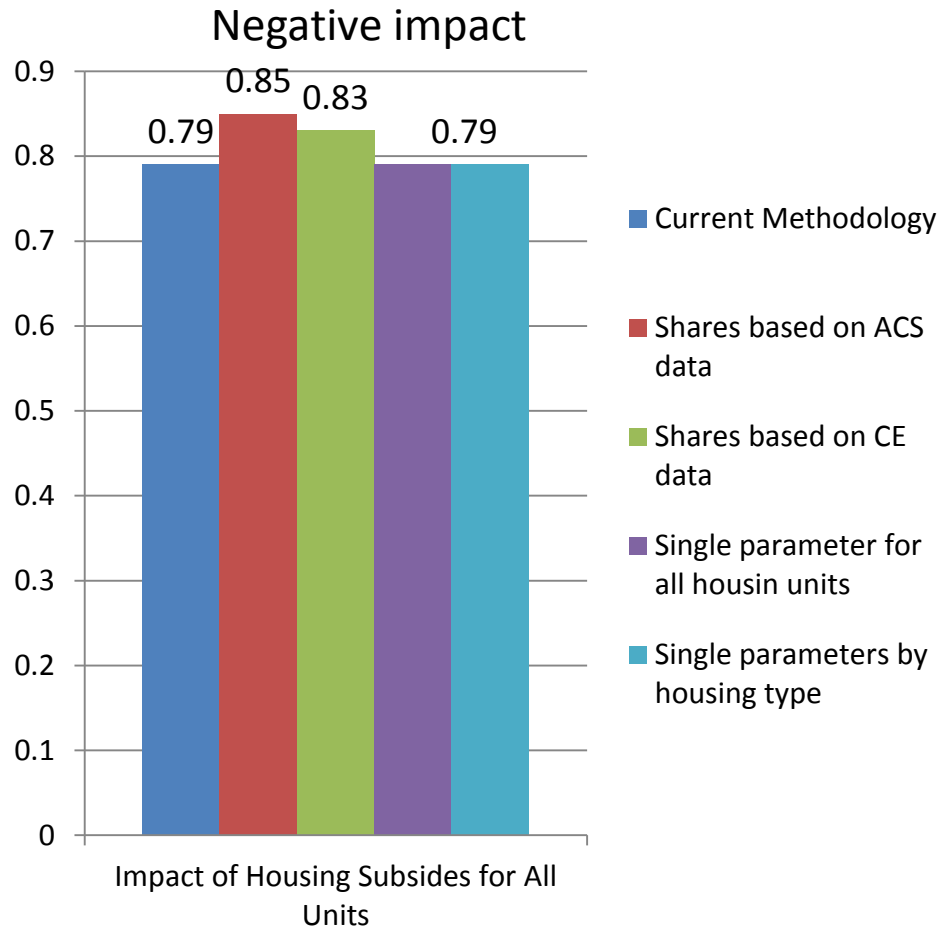


# Consumer Units with Housing Subsidy: 2015



Source: 2015 Current Population Survey Annual Social and Economic Supplement.

# Marginal Impact of Housing Subsidies on Poverty Rates: 2015



Source: 2015 Current Population Survey Annual Social and Economic Supplement.



# 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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