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Changing the Housing Share of Poverty Thresholds for the Supplemental Poverty Measure and Equivalence Scales: Does Consumer Unit Size Matter?

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Abstract

In producing the Supplemental Poverty Measure (SPM) thresholds and subsequent statistics, it is assumed that all consumer units, regardless of size and composition, share the same fraction of the thresholds on housing (shelter and utilities). The implication of this assumption is that the implicit economies of scale for housing are the same as those for the thresholds as a whole. If, on the other hand, one assumes that housing expenditures are subject to greater economies of scale than the food and clothing parts of the thresholds, it would be reasonable to use a larger percent to identify the housing portion of the thresholds for smaller families. This would have two consequences for SPM poverty statistics. First, the portion of the SPM thresholds subject to the geographic adjustment would be larger for smaller families --- increasing thresholds for those who live in areas with housing costs greater than the national median and decreasing thresholds for those who live in areas with lower housing costs Second, since the values of housing subsidies in SPM resources are capped at the housing portion of the thresholds, this would increase the value of housing subsidies for some smaller consumer units and could reduce their poverty rates. In this paper we investigate the impact of varying the housing share of the SPM poverty thresholds directly by changing housing directly first and then indirectly by applying differing equivalence scales by consumer unit size. American Community Survey (ACS) and U.S. Consumer Expenditure Interview Survey (CE) data are used to explore how housing expenditures as a share of income and expenditures on food, clothing shelter and utilities (FCSU), respectively, vary by consumer unit size. Data from the CE are also used to estimate equivalence scales; these scales result in indirect adjustment to the housing shares. The Current Population Survey Annual Social and Economic Supplement data are used to analyze the impact of allowing the housing share of the thresholds to vary on SPM poverty rates. Results suggest that choice of the housing shares (and equivalence scales) has very little impact on either overall poverty rates or the impact of housing assistance on poverty.

Introduction

In late December 2009, the Office of Management and Budget's Chief Statistician formed an Interagency Technical Working Group (ITWG) on Developing a Supplemental Poverty Measure. That group included representatives from the U.S. Census Bureau, Bureau of Labor Statistics (BLS), Economics and Statistics Administration, Council of Economic Advisers, U.S. Department of Health and Human Services, and Office of Management and Budget. In March 2010 the Interagency Working Group issued a series of suggestions to the Census Bureau and BLS on how to develop, and continue research on improvements, a new Supplemental Poverty Measure (Observations from the Interagency Technical Working Group on Developing a Supplemental Poverty Measure); recommendations for funding this work were also included.[1] The ITWG's suggestions drew on the recommendations of the 1995 report of National Academy of Sciences (NAS) Panel on Poverty and Family Assistance and the extensive research on poverty measurement conducted over the past 15 years, at the Census Bureau and elsewhere.

Thresholds for the Supplemental Poverty Measures (SPM) are produced at the BLS as a research project within the Division of Price and Index Number Research.[2] They use five years of quarterly data from the U.S. Consumer Expenditure Interview Survey (CE). These thresholds are based on out-of-pocket spending on for food, clothing, shelter, utilities and other basic goods and services (this bundle of commodities is referred to as "FCSU"). Once the two adults with two children thresholds are produced at the BLS, they are sent to the Census Bureau for two further adjustments. First, the three-parameter equivalence scale is again used to adjust for consumer/resource units with differing numbers of adults and children. And second, an adjustment is applied to the thresholds to account for differences in spending on housing across geographic areas.

In addition to the SPM thresholds, the BLS routinely reports the share of the thresholds that are devoted to out-of-pocket housing expenditures for each tenure type for the reference resource unit. For example, for the reference unit composed of two adults with two children, housing accounted for 50.5 percent of the 2015 SPM threshold for owners with mortgages, 41.1 percent of the owners without mortgages' threshold, and 49.8 percent of the renters' threshold.[3] These "shares" are used in two ways in the SPM estimates. First, they are used to determine the portion of the SPM thresholds subject to the adjustment for geographic differences in the cost of housing. Second, they are used to establish the cap for the value of rental housing assistance added to the SPM resources before determining poverty status.[4] The same share is used for all SPM resource units, independent of size and composition.

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[1] Funding for the Census Bureau has been granted but none has been forthcoming for the BLS.
[2] As the product of a research project, the SPM thresholds are not produced using BLS production quality standards. For more information see: http://stats.bls.gov/pir/spmhome.htm .
[3] See web link in previous footnote for shares for this and other years.
[4] Housing subsidies help families pay their rent and as such are added to resources for the SPM measure. However, there is general agreement that, while the value of a housing subsidy can free up a family's income to purchase food and other basic items, it will only do so to the extent that it meets the need for housing. Thus, the values for housing (rental subsidies in particular) subsidies added to other income are limited to the proportions of the threshold that are allocated to housing costs.[4]

This paper explores the implications of the practice of using for same housing share for all SPM resource units, independent of size and composition. CE and American Community Survey (ACS) data are used to explore how housing as a share of income varies by resource unit size.[5] CE data are used to estimate size equivalence scales that recognize that not all components of the thresholds are subject to the same economies of scale. Data from the 2016 CPS ASEC data are used to analyze the impact of allowing the housing share of the thresholds to vary on SPM poverty rates for 2015. Size equivalence scales are derived from analysis of 2008Q2-2013Q1 U.S. Consumer Expenditures Interview Survey data.

Supplemental Poverty Measure Thresholds

SPM thresholds use five years of quarterly data from the CE. These thresholds are based on out-of-pocket spending on for food, clothing, shelter, utilities and other basic goods and services. Food expenditures in the CE Survey are defined to include the implicit value of Supplemental Nutrition Assistance Program (SNAP) benefits in the measure of spending on food. Rents expenditures do not include the value of rental subsidies or the market value of public housing. Thresholds for "reference" consumer units composed of two adults and two children are derived using data from all consumers units with two children, the "estimation" sample. A three-parameter scale, recommended by the ITWG, is applied to the CE estimation sample expenditures to convert them to reference consumer unit expenditures. The three-parameter scale accounts for differences in adults and children, with a separate adjustment for single parents, plus a separate economies of scale parameter. The thresholds are produced at the BLS as a research project within the Division of Price and Index Number Research.[6]

The ITWG also recommended that separate thresholds be produced for owners with mortgages, owners without mortgages, and renters. Research conducted in the early days of the ITWG meetings revealed that consumer units representing each of these housing groups exhibited housing expenditures that differed in important ways based on previously made housing choices. The use of housing expenditures for consumer units without a distinction for housing type could result in an overestimate of poverty. For example, owners without mortgages report substantially lower housing expenditures, on average, than do renters or owners with mortgages. Not accounting for this difference could result in an overestimate of owners without mortgages being poor.

Once the two adults with two children thresholds are produced at the BLS, they are sent to the Census Bureau for two further adjustments. First, the three-parameter equivalence scale is again used to adjust for consumer/resource units with differing numbers of adults and children. And second, an adjustment is applied to the thresholds to account for differences in spending on

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[5] For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors ,please see the "American Community Survey Multiyear Accuracy of the Data (5-year 2010-2014)" available at http://www2.census.gov/programs-surveys/acs/tech_docs/accuracy/MultiyearACSAccuracyofData2014.pdf.

[6] As the product of a research project, the SPM thresholds are not produced using BLS production quality standards. For more information see: http://stats.bls.gov/pir/spmhome.htm .

housing across geographic areas. The American Community Survey (ACS) data on rents paid (including utilities) are used for this geographic adjustment.

The three-parameter equivalence scale is applied to the two-adults-two-children thresholds to derive the SPM thresholds for resources units of differing numbers of adults and children. Of course this means that the dollar values of the thresholds change with composition and size and the dollar values of the constant housing shares will change. However, accounting for differing needs of adults and children are not expected to fully account for differences in economies of scale, particularly for housing. If there are additional economies of scale for housing, the economies of scale parameter would be expected to change with size; a result is that the housing shares of the thresholds would also change. Yet, in the derivation of the current SPM thresholds, the economies of scale parameter remains constant.

Given that housing is expected to exhibit greater economies of scale than food and clothing, it seems reasonable to examine the impact of using smaller or larger portions of the thresholds to account for differences in economies of scale for housing. As noted earlier, this would have two consequences for SPM rates. First, the portion of the SPM thresholds subject to the geographic adjustment would be larger for smaller families --- increasing thresholds for those who live in areas with housing costs greater than the national median and decreasing thresholds for those who live in areas with lower housing costs Second, since the values of housing subsidies are capped at the housing portion of the thresholds, this would increase the value of housing subsidies for some smaller families and could reduce their poverty rates.

During the ITWG meetings held in 2010, there was much ongoing research, examining the impact of various assumptions being considered for the production of the SPM thresholds, among these, economies of scale. Instead of allowing for differing economies of scale for housing, the group decided to keep the economies of scale parameter constant while allowing for differences in housing expenditures to be accounted for through the production of separate housing type thresholds and by making adjustment for the number of adults and children. Test SPM thresholds were first presented to academic community during the November 2010 Southern Economics Association Annual Meetings (Garner, 2010). As a discussant of the paper, John Bishop (2010) was rather critical of holding the economies of scale parameter constant.

Not until Renwick and Mitchell (2015) looked at the results of replacing the current percentage of the threshold assigned to housing for one and two person families was the assumption of constant economies of scale for housing tested. This exercise used 70 percent for one-person families and 60 percent for two-person families.[7] Using this method the poverty rate for persons reporting housing assistance fell from 34.7 percent to 31.8 percent. This reduced the percent of SPM units reporting assistance with zero subsidies from 17.6 percent to 13.6 percent and the percent capped from 50.5 percent to 29.9 percent. The aggregate amount of subsidies increased from 21.6 billion with the current method to 26.0 billion

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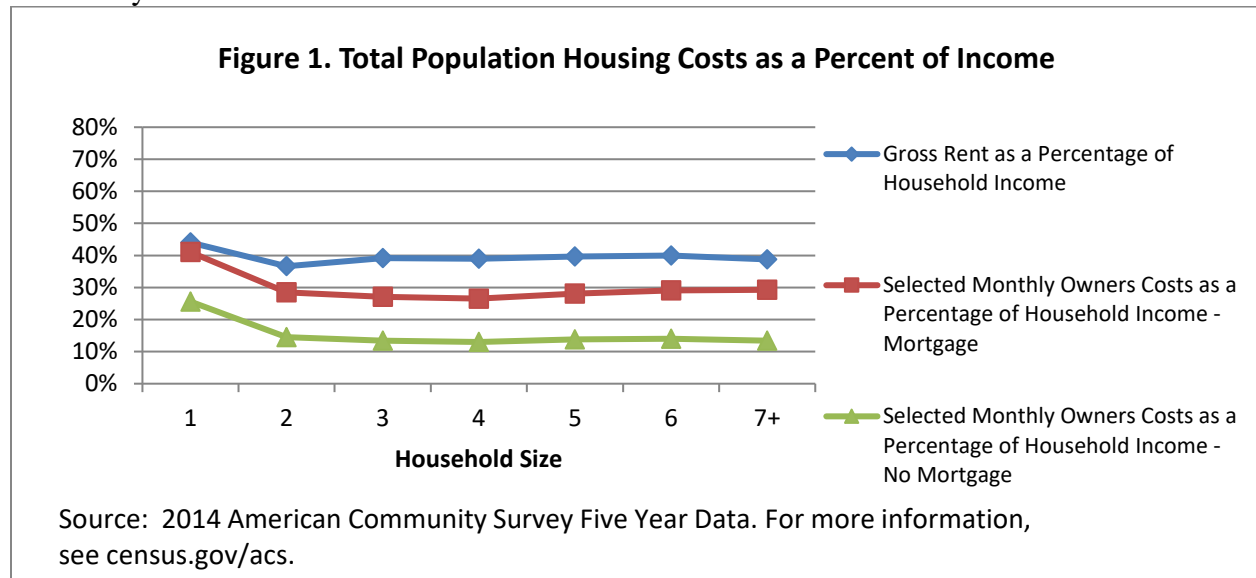[7] These percentages were derived from a rough estimate of an alternative housing share that assumed small economies of scale for food (based on USDA factors associated with their cost of food at home estimates) and no economies of scale for clothing and miscellaneous. This left residual housing percentages of the threshold of 70 percent and 60 percent for one and two person resource units.

The objective of this paper is to further investigate whether or not the housing share of the SPM poverty thresholds should vary directly by changing the shares or through application of an equivalence scale for housing (and for food plus clothing) that varies by a consumer unit size. CE and ACS data are used to explore how housing as a share of income varies by resource unit size. CE data are used to estimate size equivalence scales that recognize that not all components of the thresholds are subject to the same economies of scale. Data from the 2016 CPS ASEC data are used to analyze the impact of allowing the housing share of the thresholds to vary on SPM poverty rates for 2015. Size equivalence scales are derived from analysis of 2008Q2-2013Q1 U.S. Consumer Expenditures Interview Survey data.
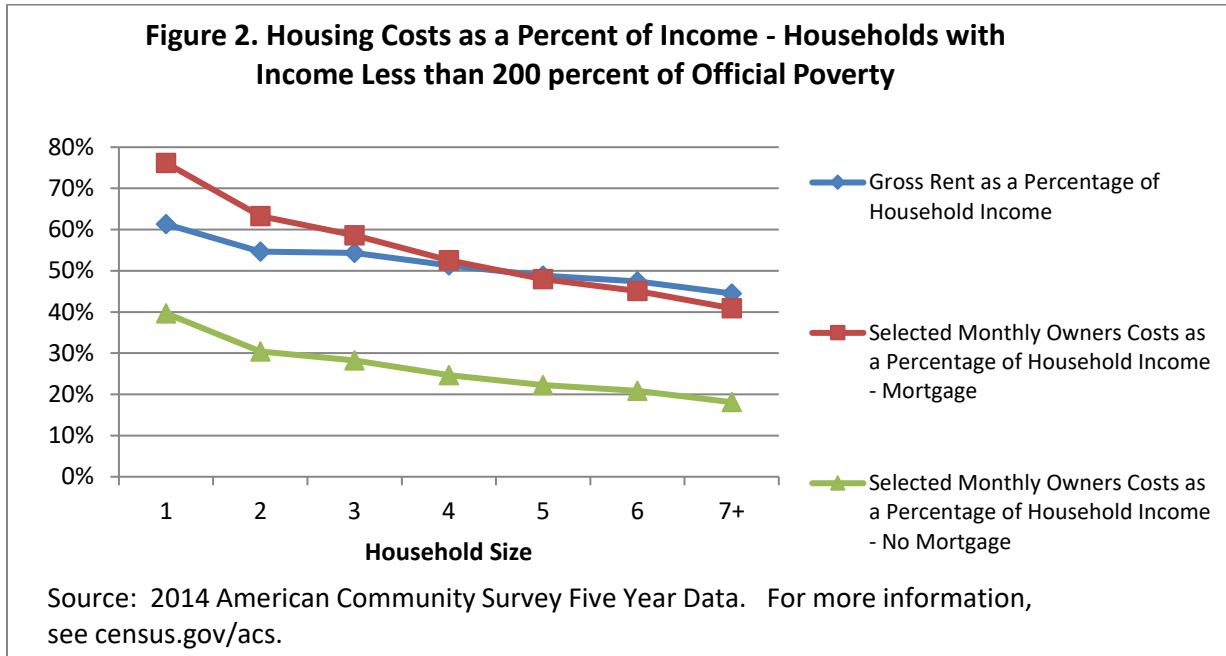
Estimating Housing Shares

This paper explores two sources of data on shelter and housing expenditures that could be used to calculate the housing shares: the CE and the ACS. From the ACS we can get a measure of housing costs as a percent of income, not as a percent of total expenditures. The advantage of the ACS is that the data is readily available from AmericanFactFinder. However, the ACS definition of housing costs includes items that are not included in the estimation of the SPM thresholds. For example, ACS calculations of total owners' costs include payments on home equity loans, payments that are not included in the estimation of the SPM thresholds using CE data. On the other hand, the CE calculations include expenditures for owner and renter maintenance and repairs including parking, landscaping, rent as pay for renters, and telephone service and phone cards but these payments are not included in the ACS estimate. See Appendix 1 for a more detailed definition of housing costs in the ACS. The following graph shows the pattern of owners and rental costs as a percent of income by household size from the ACS. Comparable figures are shown in Appendix 2 based on data form the CE data: housing expenditure shares as percentages of income before taxes and as shares of total expenditures as defined by the BLS.

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

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

A problem with using the entire ACS sample (or the CE sample) to estimate these income shares is that the share of income devoted to housing may vary depending on the household's

relative location in the income distribution. Specifically, lower income households may devote more of their annual income to housing than higher income households. To address these concerns, we use ACS data to look at these rental/owner costs as a percent of income for the bottom part of the income distribution. The following figure looks at the relationship between housing costs as a percent of income and household size for households with income below 200 percent of the official poverty threshold.

Figure 2. Housing Costs 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.

Using data from the CE, we can look at housing expenditures as a percent of expenditures on the bundle of goods and services covered by the SPM thresholds – food, clothing, shelter, utilities (FCSU) plus 20 percent for other basic needs. Since the definition of housing is consistent in such shares, the CE could be a better source for housing share estimates for all consumer units even through the estimated housing shares would not be based on the SPM threshold estimation sample expenditures. The following graph shows these relationship using all consumer unit quarterly data from 2008Q2-2013Q1 from the CE by consumer unit size for each housing tenure group.

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Figure 3. Housing Expenditures as a Percent of the Sum of Food, Clothing, Shelter, Utilities (FCSU), and Other Basic Needs (20%) Expenditures
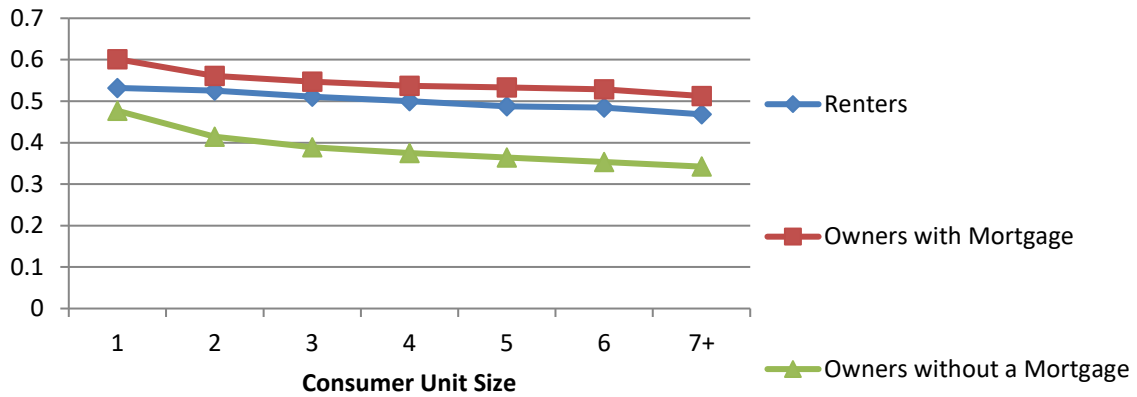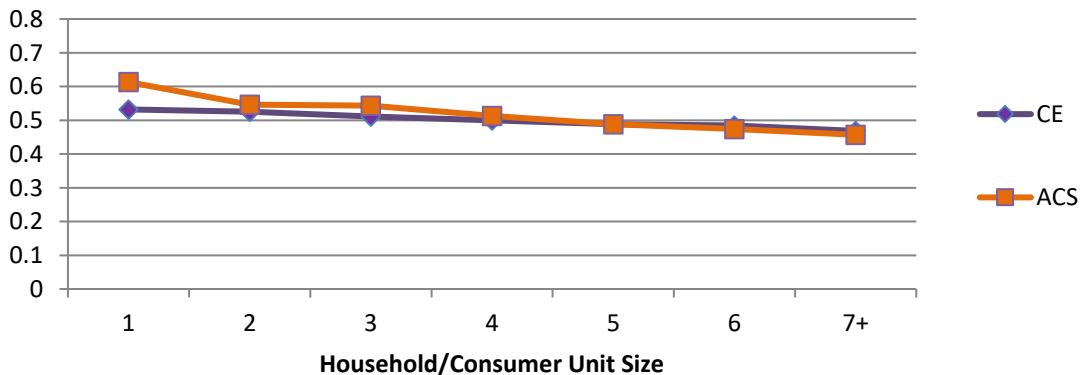
Source: Quarterly Consumer Expenditure Survey, all consumer units participating in 2008Q2-2013Q1

Unlike the ACS results, the housing shares of owners with mortgages relative to total FCSU*1.2 is higher for owners with mortgages, followed by renters. Not surprisingly, all of the housing expenditures shares are higher than for the ACS which are related to total gross income. No statistical testing has been done comparing the shares across surveys, housing tenure types, or consumer unit size.

Despite the conceptual and definitional differences in the ACS and CE, for renters and owners without a mortgage the relationship between housing shares and household/consumer unit size are similar. There is a divergence in the relationship for owners with a mortgage, with the ACS estimates more sensitive to changes in household size.

Figure 4. Housing Shares for Renters

Sources: American Community Survey and Consumer Expenditiures Survey as defined earlier. For more information, see census.gov/acs.

Figure 5. Housing Shares for Owners without a Mortgage
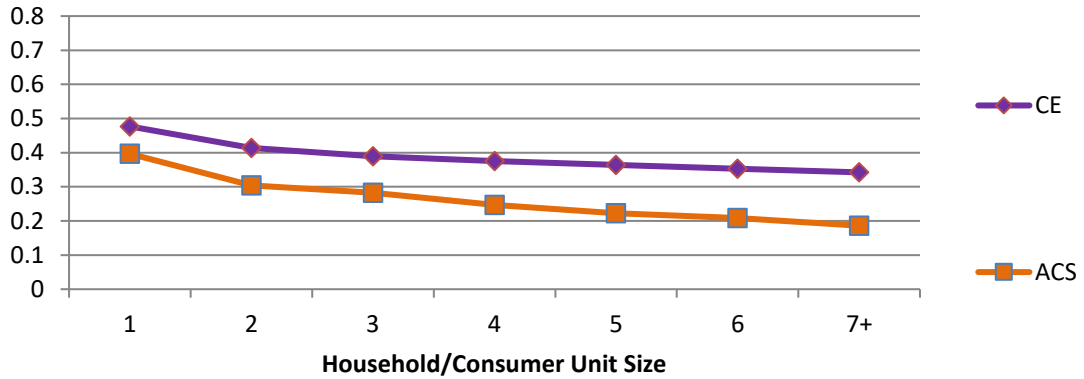
Household/Consumer Unit Size

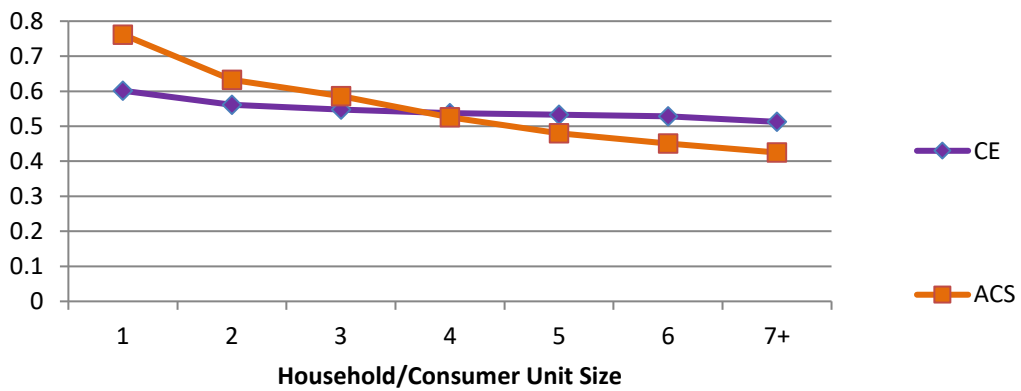Sources: American Community Survey and Consumer Expenditiures Survey as defined earlier. For more information, see census.gov/acs.

Figure 6. Housing Shares for Owners with a Mortgage

Household/Consumer Unit Size

Sources: American Community Survey and Consumer Expenditiures Survey as defined earlier. For more information, see census.gov/acs.

Equivalence Scales

In this section of the paper we describe two types of equivalence scales which we use to examine the impact on SPM poverty rates. The first is the equivalence scale recommended by the Interagency Technical Working Group (ITWG, 2010), and the second set is based on the relationship between housing expenditures and consumer unit size.

Interagency Technical Working Group Scale

The Interagency Technical Working Group (2010) recommended a 3-parameter equivalence scale to adjust the SPM thresholds for consumer units with different numbers of adults and children and to account for their differing needs. The scale, first proposed by Betson (1996), has been used by the BLS and Census Bureau since the SPM was first produced. A

distinguishing feature of the three-parameter equivalence scale is the adjustment for single parents; no adjustment for single parents is included in the two-parameter scale proposed by the National Academy of Sciences (NAS) Panel (Citro and Michael, 1995). The three-parameter scale is shown below:

One and two adults $= (A)^f$ (1)
Single adults with children scale $= (1 + a + \beta(K\text{-}1))^f$ (2)
Multiple adults with children scale $= (A + \beta K)^f$ (3)

where

a = parameter to account for the needs of the first child,
β = parameter to account for the needs of additional children,
f = parameter to account for economies of scale within the consumer unit,
A = number of adults within the consumer unit, and
K = number of children within the consumer unit.

The parameters a, β, and f were estimated by Betson to fit the cost of children literature. For consumer units with one or two adults, neither with children, f is set to 0.5. For consumer units with children, the parameters are set to 0.8, 0.5, and 0.7, respectively.[8]

The Census Bureau uses the three-parameter scale to derive the SPM thresholds for resource units with varying numbers of adults and children but starts with the reference SPM threshold for two adults and two children. As noted earlier, the reference threshold is produced by the BLS using FCSU out-of-pocket expenditures for consumer units with two children. The same three-parameter scale (but not for CUs with adults only) is used to equivalize expenditures across all consumer units with varying numbers of adults but two children only. Once these expenditures are equivalized and converted to two-adult two child expenditures, the SPM thresholds are derived based on the mean of the 30-36th percentile of FCSU expenditures and the housing shares of expenditures for owners with mortgages, owners without mortgages, and renters, plus the 20 percent multiplier to account for other basic goods and services such as non-work transportation and personal care products (BLS, 2016; Garner, 2011).

Regression-Based Equivalence Scales

One of the oldest methods for estimating equivalence scales is attributable to Engel, who argued that the budget share devoted to food falls as standard of living rises. According to Engel, poorer families, or larger ones with the same income, spend a greater share of income on food. Here we assume that the proportion of income spent on necessities, not just food, is indicative of material well-being (i.e., households that devote the same share to necessities are equally well-off, all else constant), and thereby use an Engel approach to estimate consumer unit size equivalence scales. This method has been used in previous research to produce equivalence scales for the U.S. and for Canada using household expenditure survey data and different bundles of necessities (Phipps and Garner, 1994; Daley et al., 2014; Daley et al., 2015), and by Statistics

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[8] The NAS Panel recommended a range of 0.65 to 0.75. Bishop (2010) commented that the equivalence scale factor is too large and should be reduced given the shares of the threshold for shelter and utilities, commodity groups with large economies of scale.

Canada to estimate differences in income needs by family size for the production of Low income Cut-Offs (see Daley et al., 2015).

In this study, we identify housing expenditures as one necessity and food plus clothing as a second. In this way we apply a separate equivalence scale to housing as opposed to the other goods and services (food and clothing) that are represented by the SPM thresholds. For each necessity, we use a single-parameter approximation to estimate equivalence scales. We restrict this analysis to consumer units with four quarters of expenditures such that their reported annual income refers to the same time period as their expenditures over the same 12 months. We pool five years of CE data from 2008 quarter 2 to 2013 quarter 1 for the analysis. Five years of data are used for the production of the SPM thresholds, although for those, all quarterly data are used not just those representing four reports. We produce two sets of single-parameter equivalence scales. One based on an analysis of expenditure data for all consumer units, not distinguished by housing type, and another set with consumer unit size equivalence scales estimated for each housing type (i.e., owners with mortgages, owners without mortgages, and renters) separately. All expenditures and income are converted to constant dollars using the All Urban Consumer Units, All-Items CPI (not seasonally adjusted) before the regression models are estimated. The models are estimated with consumer unit population weights; these weights are created such that the resulting sample has the same distribution in terms of size as does the total population in each year.

The basic model is defined as in equation 4 below:

$$lnExp = \beta_0 + \beta_1 lnY - \beta_2 lnN + \cdots + \varepsilon \tag{4}$$

Exp refers to housing or food plus clothing expenditures and Y is before tax income that includes the value of SNAP benefits. N denotes consumer unit size. We control for rural/urban status, region (Northeast, South, Midwest, and West) and time (2008, 2009, 2010, 2011, 2012) using the pooled data. β_j are parameter estimates.. ε is the error term.

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

$$lnSHARE = \beta_0 + (\beta_1 - 1) \ln Y - \beta_2 lnN + \cdots \tag{5}$$

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

$$\beta_0 + (\beta_1 - 1) \ln Y_1 + \cdots = \beta_0 + (\beta_1 - 1) \ln Y_N - \beta_2 lnN + \cdots \tag{6}$$

Cancelling and rearranging terms yields the single-parameter approximation as presented in equation 7 below.

$$\frac{Y_N}{Y_1} = N^{\frac{\beta_2}{\beta_1 - 1}} \tag{7}$$

Suppose $\frac{\beta_2}{\beta_1-1} = 0.3$. This would imply that a consumer units of household of two people requires 1.23 (i.e., two raised to the power of 0.3) times the income as an otherwise similar single person to have the same material standard of living; a consumer unit of three people requires 39 percent more income, a consumer unit of four requires 52 percent more, and so on. Figure 7 includes the single parameter equivalence scales based on housing expenditures separately from food plus clothing expenditures, consumer unit size, and before tax income as defined by the BLS for CE data release. As expected, the equivalence scale consumer unit size parameters for housing are less than that for food plus clothing for both estimations. The scales diverge, with greater economies of scale for housing and to fewer economies of scale for food and clothing, when the parameters are based on separate housing tenure group regression models. Standard errors have not been produced and thus it is not possible for us to indicate whether the differences are statistically significantly different across the parameters. The food plus clothing parameters are in the relative range of those presented by Daley et al., (2014) for the U.S. In that study, using data from 2005Q2-2013Q1, the equivalence scale parameter for total food was 0.561, and for food, clothing, and housing it was 0.421. Separate scales for housing were not produced.
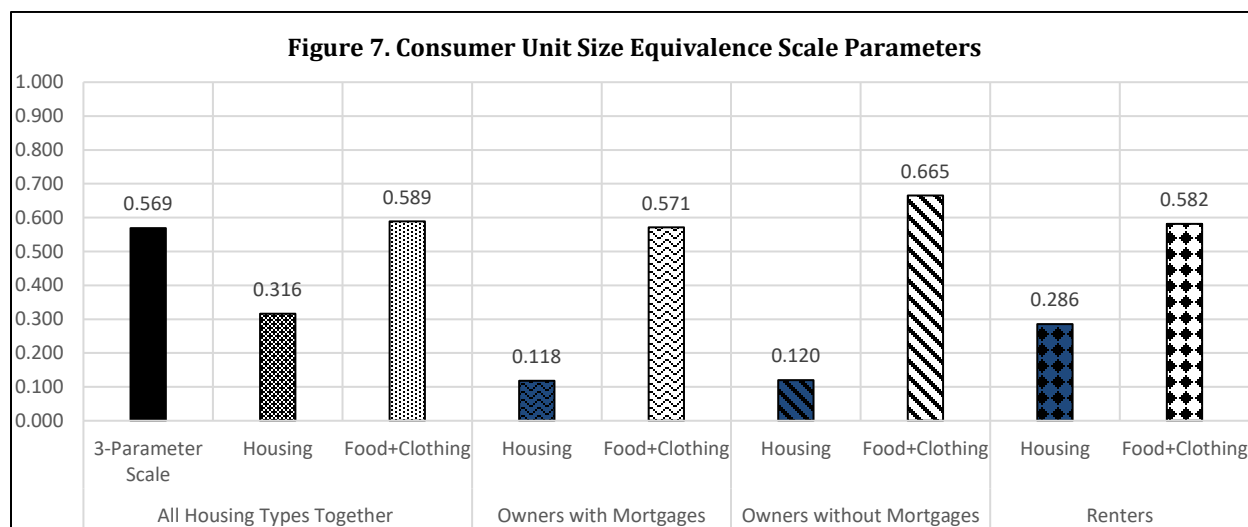
Figure 7. Consumer Unit Size Equivalence Scale Parameters

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.

The differences in economies of scale for owners versus for renters is most interesting. Research is needed to explore why the scale parameter is more than twice that for renters. Is it because of differences in the number of bedrooms in renter units versus owner units? Or is it related to something else entirely?

Greater economies of scale for housing imply greater shares of income being allocated to housing by smaller consumer units versus larger ones. We can examine how this comes through in estimated SPM thresholds for consumer units of varying sizes. Using the equivalence scale parameters presented in Figure 7, we produce thresholds for consumer units with differing consumer unit sizes. We start with the SPM thresholds for two adults and two children, published by the BLS. These are reproduced below in Table 1.

Table 1. Official and Research Experimental Supplemental Poverty Measure (SPM) Thresholds for Two Adults and Two Children, 2015

	Threshold amount
SPM Owners with mortgages	$25,930
SPM Owners without mortgages	$21,806
SPM Renters	$25,583

http://www.bls.gov/pir/spm/spm_chart1_2015data.htm

The three-parameter and estimated equivalence scale parameters are applied to the reference consumer unit thresholds for 2015. The results are show in Figure 8. Thresholds are plotted for renters, owners with mortgages, and owners without mortgages using each set of equivalence scale parameters. All SPM thresholds are based on FCSU with the 20 percent multiplier. The first panel includes thresholds produced for seven consumer unit types, varied by the number of adults and children, with the largest for three adults with three children, or six people. The other two panels represent the thresholds for consumer units with one to six people, with no distinction for adults and children. Thresholds for consumer units with one person, the only comparable thresholds across the three panels, suggest that the three-parameter equivalence scale results in SPM thresholds that are lower than those based on single parameter estimations. Thus, based on these results, the three-parameter scale does not sufficiently account for the housing expenditures for single person consumer units relative to those with more members. The second two panels suggest that economies of scale for renters differ from that of owners, as surmised from the bar charts presented in Figure 7. Each of the equivalence scales results in differing housing shares as a percentage of gross income. These results are shown and presented in Figure 9.

Figure 8. 2015 SPM Thresholds Based on Different Equivalence Scales: Three- Parameter versus Single Consumer Unit Size Parameter
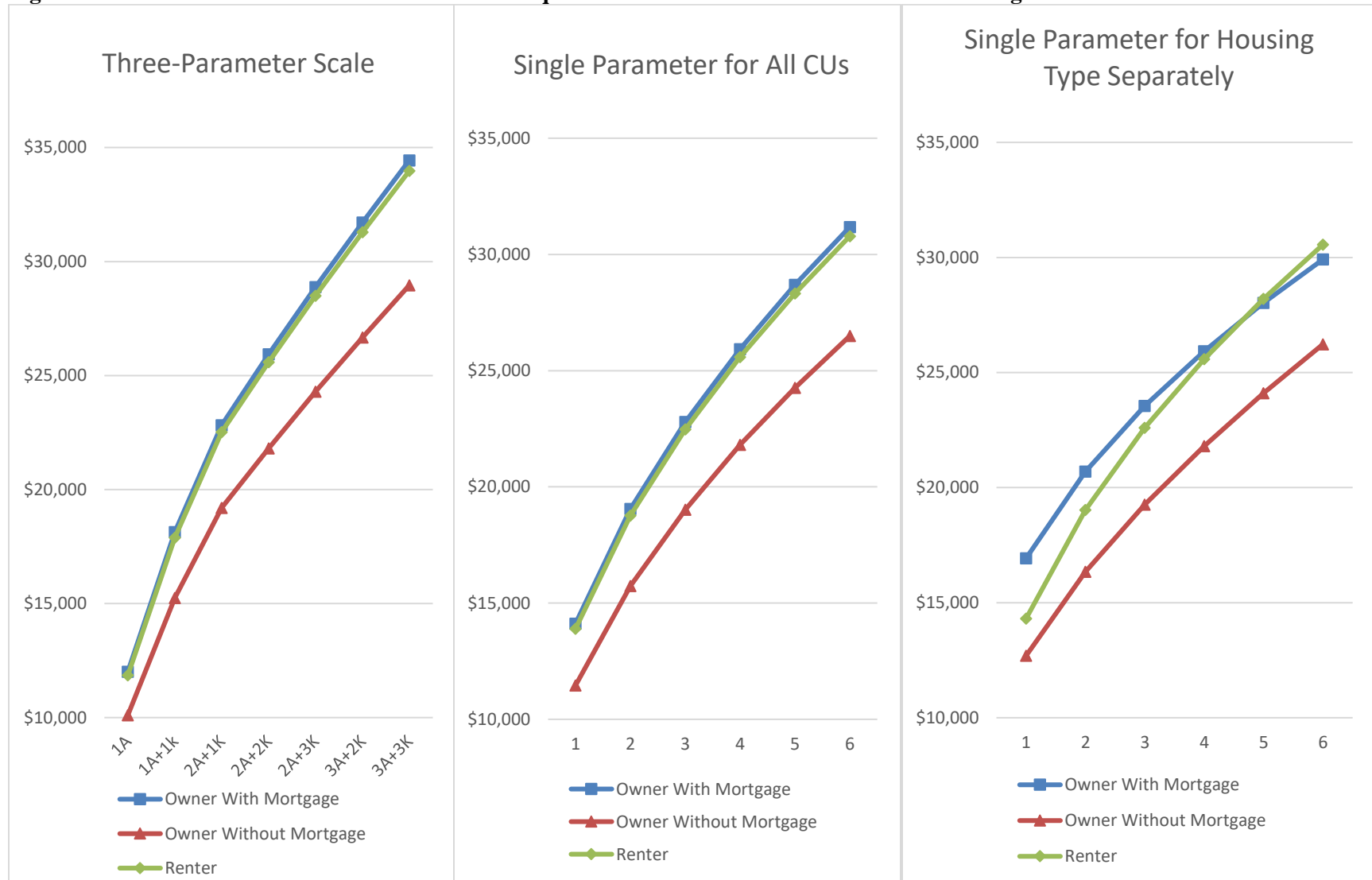
Source: Bureau of Labor Statistics, Garner's analysis of internal CE Interview data from 2008Q2 through 2013Q1, four quarters of data for each consumer unit.

Table 2. Impact of Alternative Housing Share/Equivalence Scale Assumptions on Overall SPM Rates and for Units with Housing Assistance
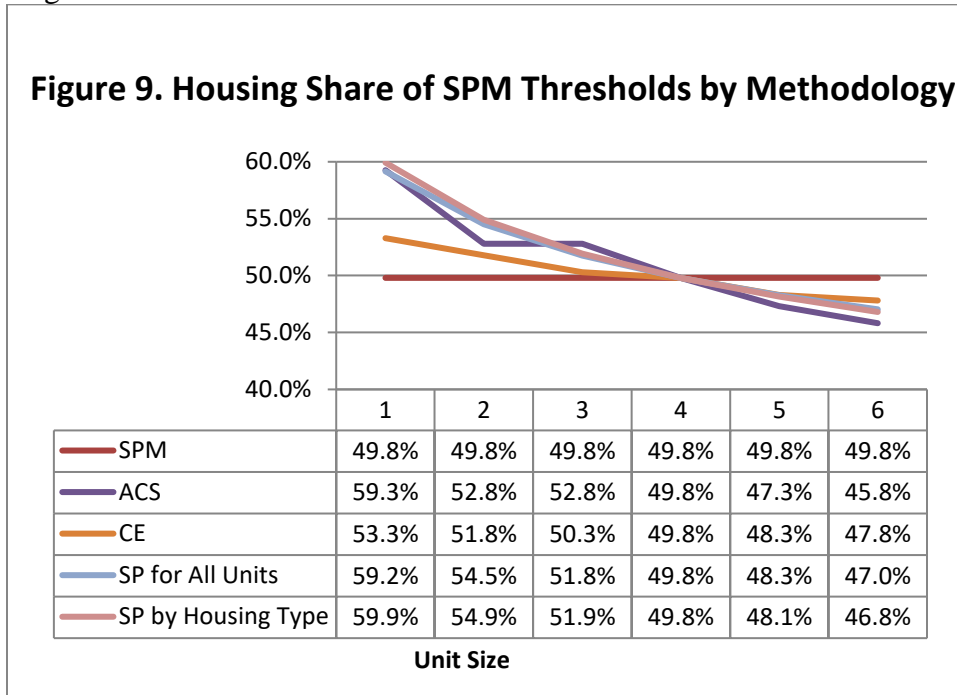
Method	Overall SPM Rate (percent)	SPM Rate for Units Reporting Housing Assistance (percent)	Percent of SPM Units Reporting Assistance with $0 Housing Subsidy (percent)	Percent of SPM Units Reporting Assistance with Capped Housing Subsidy (percent)	Aggregate Amount of Housing Subsidies Assigned (billions)	Impact of Housing Assistance on SPM Rate (percentage points)	Impact of Housing Assistance on SPM Rate for Those with Assistance (percentage points)
Current Methodology	14.32	31.47	24.55	44.74	$20.4	-0.79	-21.14
Shares based on ACS data	14.20	29.8	21.70	36.84	$22.7	-0.85	-22.6
Shares based on CE data	14.26	30.61	23.14	42.97	$21.3	-0.83	-21.91
Single Parameter for All Units	14.56	34.69	19.67	26.23	$24.6	-0.79	-20.97
Single Parameter for Housing Type Separately	15.14	35.44	19.57	24.01	$25.0	-0.79	-20.86

Source: 2016 Current Population Survey Annual Social and Economic Supplement

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Impact of Changing Housing Share on SPM Estimates

How do changing housing shares, either directly or indirectly through the use of estimated equivalence scales, impact SPM poverty estimates? In order to assess the impact of changing shares we estimated SPM poverty rates using housing shares that varied by number of persons in the SPM resource unit. These adjustments change two elements of the SPM calculation: the share of the threshold subject to the geographic cost-of-living adjustments and the cap used for housing assistance.

The reference unit for the published SPM thresholds is composed of two adults and two children, or four people. In this section we compare the impact of changing the housing shares relative to the shares for this reference unit. The shares for units of other scales are scaled proportionate with the CE and ACS results. For example, as shown in Figure 9, the housing (shelter plus utilities) portion of the thresholds for renters for the published SPM estimates is 0.498. Using the ACS housing to income shares, the percentage for single-person renter resource units increase to 0.593 while using the CE housing to FCSU+1.2 share is 0.528. The shares for renter units with six members decreases to 0.458 using the ACS estimates and to 0.483 using the CE estimates.

Figure 9. Housing Share of SPM Thresholds by Methodology

	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%

Unit Size

Direct Adjustment of Housing Shares

Table 2 includes the results of modifying the housing shares and their impacts on overall SPM poverty rates.[9] The rates vary little. However, changes for the SPM estimates for resource units with housing subsidies are relatively larger.

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[9] The estimates in this paper are from the 2016 Annual Social and Economic Supplement (ASEC) to the Current Population Survey (CPS). The estimates in this paper (which may be shown in text, figures, and tables) are based on responses from a sample of the population and may differ from actual values because of sampling variability or other factors. As a result, apparent differences between the estimates for two or more groups may not be statistically significant. All comparative statements have undergone statistical testing and are significant at the 90

- Using the ACS-share adjustment, SPM poverty rates for units with housing subsidies fall from 31.5 to 29.8 percent. Using the CE-share adjustment, SPM rates for these units fall from 31.5 to 30.7
- The percent of units reporting assistance, but assigned a $0 subsidy, falls from 24.5 percent with the current methodology to 21.7 percent and 23.3 percent with the alternative shares.
- The number of SPM units with capped housing subsidies falls from 44.7 percent to 36.8 percent and 43.0 percent.
- There is a small increase in the aggregate value of housing subsidies, from $20.4 billion to $22.7 billion using the ACS-based shares. Using the CE-based shares the total is $21.3 billion, not statistically different than the aggregate value with the current method. (The difference between the ACS-based aggregate and the CE-based aggregate is not statistically significant.)
- The impact of housing subsidies on the SPM rates of those reporting housing assistance increases from 21.1 percentage points to 22.6 percentage points and 21.9 percentage points.

Implicit Adjustment of Housing Shares via Equivalence Scales

Also shown in Table 2 are the results when the housing shares are implicitly adjusted through the use of estimated equivalence scale parameters.
- Overall SPM poverty rates increase from 14.3 percent to 14.6 percent with the application of the housing and food plus clothing equivalence scale parameters estimated for all housing units together. Estimating the alternative equivalence scale by housing type increases the SPM rate to 15.1 percent.
- SPM rates for individuals in units with housing assistance increase from 31.5 percent to 34.7 percent and 35.4 percent.
- The percent of units reporting assistance but assigned a $0 subsidy fall from 24.5 percent with the current methodology to 19.7 percent and 19.6 percent with the alternative equivalence scales. (The difference between the percent with zeros with the two alternative methods is not statistically significant.
- The number of SPM units with capped housing subsidies falls from 44.7 percent to 26.2 percent and 24.0 percent.
- There was an increase in the aggregate value of housing subsidies, from $20.4 billion to $24.6 billion and $25.0 billion. (The difference between the aggregates using the two alternative approaches is not statistically significant.)
- The impacts of housing subsidies on the SPM rates of those reporting housing assistance were 21.1 percentage points (current method), 21.0 percentage points (Single Parameter for All Units) and 20.9 percentage points (Single Parameter by Housing Type). The differences across the three methods were not statistically significant.

Conclusion

While conceptually the estimated equivalence scales that recognize the different economies of scales for housing separately from food plus clothing, this exercise has shown that empirically these differences do not matter. One of the major advantages of the SPM is its ability to gauge the impact of government programs on poverty rates. We have shown in this paper that the choice of housing share or the choice of equivalence scale (as estimated) has very little impact on the measure of the impact of housing assistance on overall poverty rates. Even the impact on the poverty rates of those reporting housing assistance is relatively small. Therefore, this does not seem to be a refinement of the SPM methodology worth pursing at this time.

Future research might investigate the impact of these alternative methodologies on other subgroups of the population, e.g. the individuals aged 65 and older, one-person SPM resource units, and renters.

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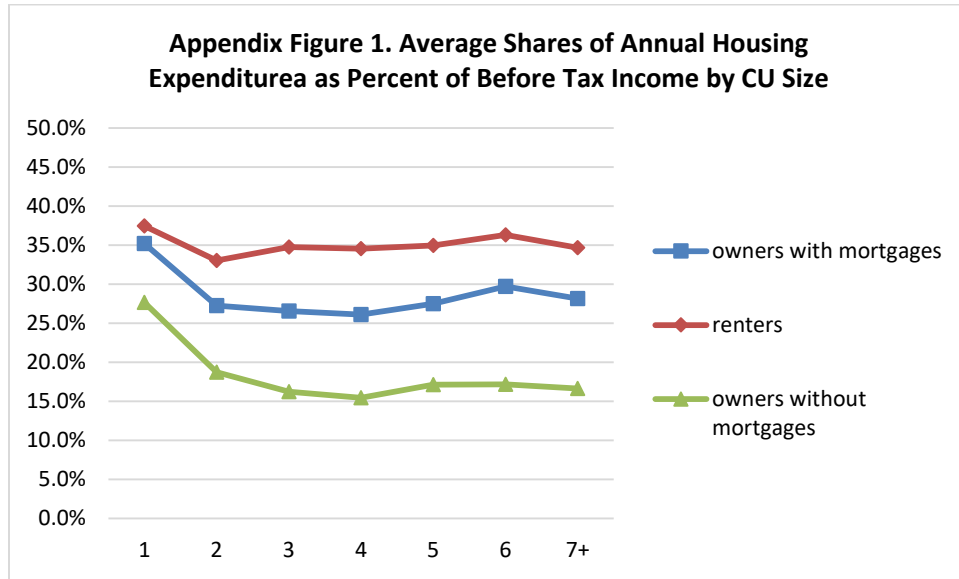
Appendices

Appendix 1: American Community Survey Housing Cost Variables
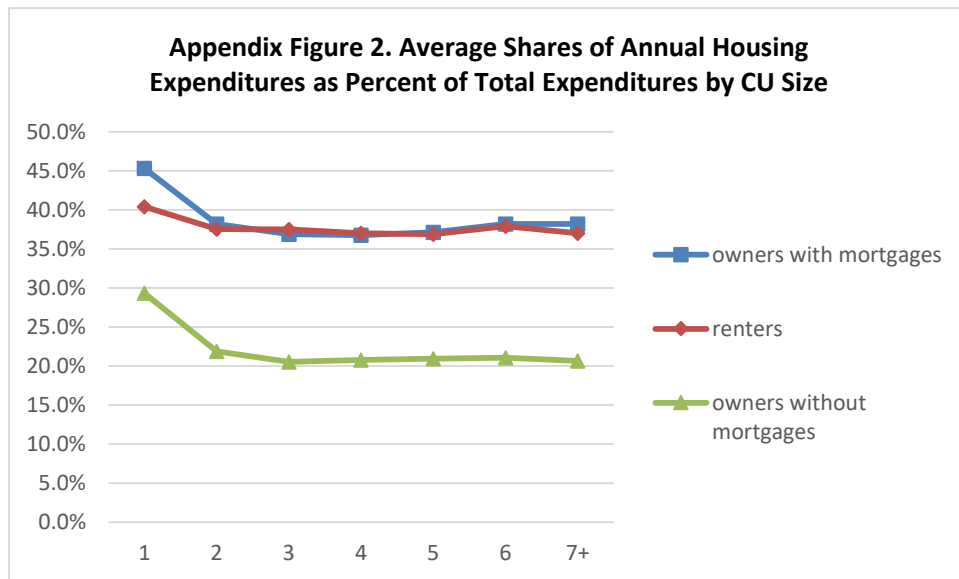
The data on gross rent were obtained from answers to Housing Questions 11a-d and 15a in the American Community Survey. Gross rent is the contract rent plus the estimated average monthly cost of utilities (electricity, gas, and water and sewer) and fuels (oil, coal, kerosene, wood, etc.) if these are paid by the renter (or paid for the renter by someone else). Gross rent is intended to eliminate differentials that result from varying practices with respect to the inclusion of utilities and fuels as part of the rental payment. The estimated costs of water and sewer, and fuels are reported on a 12-month basis but are converted to monthly figures for the tabulations. Renter units occupied without payment of rent are shown separately as "No rent paid" in the tabulations.

The data on selected monthly owner costs were obtained from Housing Questions 11a-d and Question 13 and Questions 17 through 21 in the American Community Survey. The data were obtained for owner-occupied units. Selected monthly owner costs are the sum of payments for mortgages, deeds of trust, contracts to purchase, or similar debts on the property (including payments for the first mortgage, second mortgages, home equity loans, and other junior mortgages); real estate taxes; fire, hazard, and flood insurance on the property; utilities (electricity, gas, and water and sewer); and fuels (oil, coal, kerosene, wood, etc.). It also includes, where appropriate, the monthly condominium fee for condominiums (Question 13) and mobile home costs (Question 21) (installment loan payments, personal property taxes, site rent, registration fees, and license fees). Selected monthly owner costs were tabulated for all owner-occupied units, and usually are shown separately for units "with a mortgage" and for units "not mortgaged."

Appendix Figure 1. Average Shares of Annual Housing Expenditurea as Percent of Before Tax Income by CU Size

Source: U.S. Consumer Expenditure Interview Survey, population weighted sample of all consumer units participating in survey from 23008Q2-2013Q1.

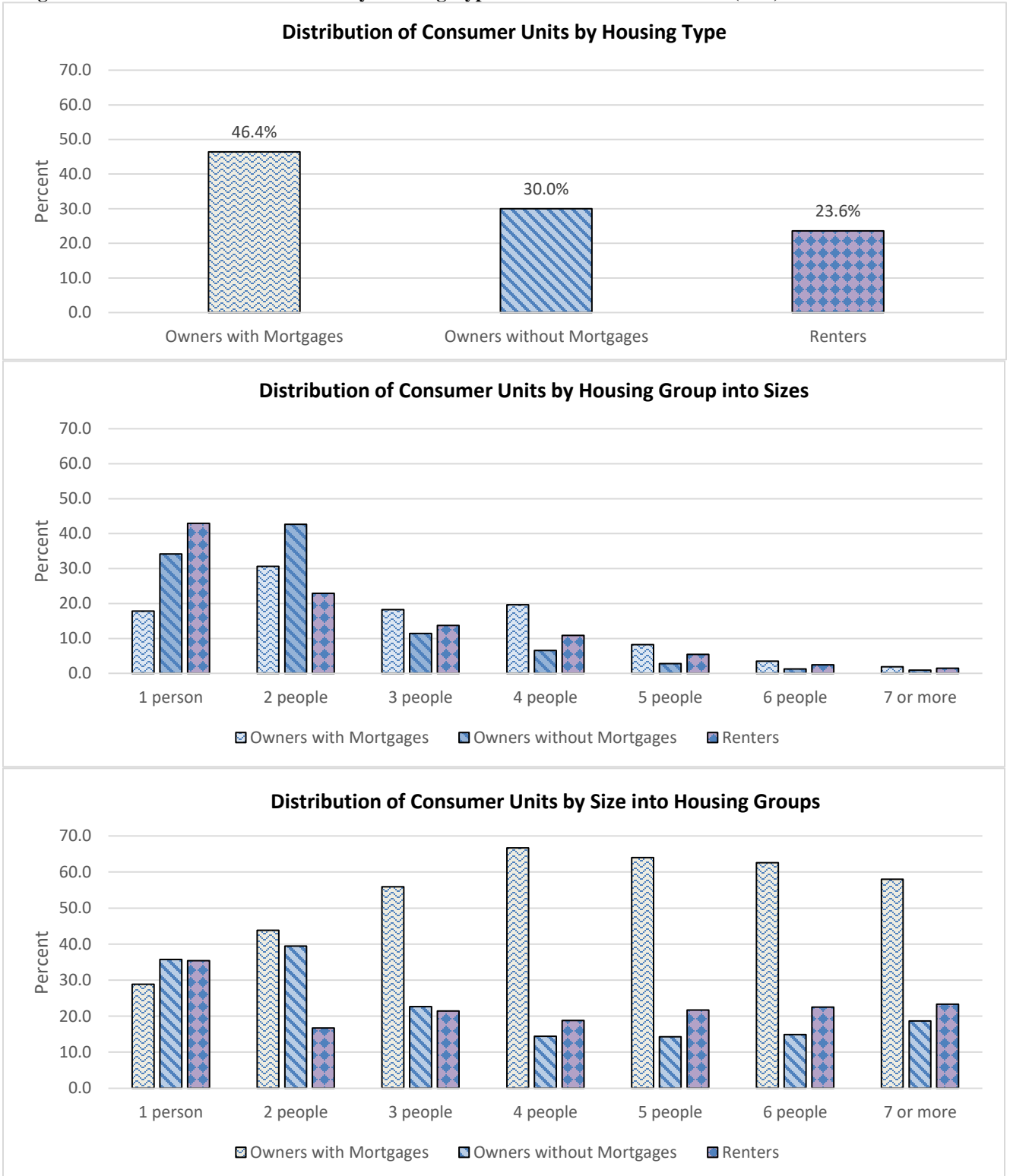Appendix Figure 2. Average Shares of Annual Housing Expenditures as Percent of Total Expenditures by CU Size

Source: U.S. Consumer Expenditure Interview Survey, population weighted sample of all consumer units participating in survey from 23008Q2-2013Q1.

Appendix 3.
Weighted Consumer Unit Distributions by Housing Types and Number of Members (Size)

Distribution of Consumer Units by Housing Type

Owners with Mortgages: 46.4%
Owners without Mortgages: 30.0%
Renters: 23.6%

Distribution of Consumer Units by Housing Group into Sizes

Legend: Owners with Mortgages, Owners without Mortgages, Renters

Distribution of Consumer Units by Size into Housing Groups

Legend: Owners with Mortgages, Owners without Mortgages, Renters

Source: Bureau of Labor Statistics, Garner's analysis of internal CE Interview data from 2008Q2-2013Q1, four quarters of data for each cons unit; Statistics for equivalence scale regression samples.