Supplemental Poverty Measure: A Comparison of Geographic Adjustments with Regional Price Parities vs. Median Rents from the American Community Survey: An Update[1]

SEHSD Working Paper Number 2017-36

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Abstract

Official poverty statistics are used in the United States to evaluate economic well-being at the national level, and to distribute federal anti-poverty funds across states and urban areas. However, these statistics are based on thresholds or poverty lines that do not take into account geographic differences in price levels. To provide a more useful estimate, the Census Bureau has since 2010 issued a supplemental poverty measure (SPM). Unlike the official measure, the SPM adjusts the poverty thresholds for geographic differences in the cost of housing. This paper highlights the results of two different adjustments to the national poverty thresholds. The first is based solely on differences in tenant rents while the second is a composite index that includes differences in the price levels of food, apparel and rents. Adjustment using the first index increases the national poverty rate, while the second decreases the rate. The composite index adjustments are larger at the national level, across four broad regions, and across most states.

Keywords: poverty rates; sub-national price levels, income adjustment.

1. Introduction

Each year, the Census Bureau estimates two sets of poverty measures. The official measure, developed in the 1960s, is based on a family's cash income relative to national thresholds below which a family is considered to be in poverty. Since 2010, the Census Bureau has also issued a supplemental poverty measure (SPM). The SPM differs in many ways from the official measure, including making an adjustment to the housing portion of the poverty thresholds for geographic differences in the cost of housing.[2] These differences are measured using American Community Survey (ACS) data on median rent and utilities for two-bedroom housing units, and the resulting geographic cost index is henceforth referred to as the median rent index (MRI).

One shortcoming of the MRI is that it does not account for geographic differences in the cost of other elements of the SPM threshold. This methodological choice was made, in part, because interarea price data had not been available (see Interagency Technical Working Group, 2010). However, since 2014, the Regional Economics Directorate of the Bureau of Economic Analysis (BEA) has released regional price parities (RPPs) which measure price level differences across regions for various consumption expenditure classes. In an earlier paper, the authors compared the MRI estimates to estimates using the all items RPPs published by the BEA (see Renwick, Aten, Figueroa and Martin, 2014). A concern raised about the all items RPP was that it includes many goods and services not in the SPM thresholds.

[1] This paper reports the results of research and analysis undertaken by Census Bureau and Bureau of Economic Analysis staff. Any views expressed are those of the authors and not necessarily those of the U.S. Census Bureau or the Bureau of Economic Analysis.

[2] For a complete summary of the differences between the official poverty measure and the supplemental poverty measure, see Renwick and Fox, 2016 and Interagency Technical Working Group, 2010.

This paper uses a more narrowly-defined RPP, henceforth referred to as the FAR, which is restricted to the three items included in the SPM thresholds: food, apparel, and rents.

We find that adjustments to the poverty rates are larger using the FAR at the national and regional levels, as well as across most states. Although the adjustments are larger, the total poverty counts are lower using the FAR, in large part due to the distribution of population: 59% of the U.S. population lives in the South and Midwest regions where the thresholds and the poverty count decreases, and only 41% live in the more expensive Northeast and West regions.

2. The ACS Median Rent Index (MRI)

The MRI is the ratio of the median gross rent of a two-bedroom unit with complete kitchen and plumbing facilities in a specific metro area or state to the U.S. median gross rent of the same type of unit (see Renwick, 2011). The MRI is applied to the national threshold values, as defined by the Consumer Expenditure survey (CE), in proportion to the national average shares of housing and utility expenditures from total expenditures.[3] The result is a metro area- and state-specific threshold value, and the poverty rate is given by the estimated population below this threshold.

$$Threshold_{ijt} = [(HousingShare_t \times MRI_{ij}) + (1 - HousingShare_t)] \times Threshold_t$$

where *ij* refer to the geographic unit (state and metro area, respectively), *t* refers to housing tenure (owner with mortgage, owner without a mortgage, renter), and the housing share ranges from 40 to 50 percent of total expenditures, depending on tenure status. The thresholds are the dollar values for income below which households are considered in poverty. The MRI was estimated using the 2015 five-year file from the ACS. Indexes and adjusted thresholds were estimated for 385 metro and state areas, covering the entire United States.

3. Regional Price Parities (RPPs)

RPPs are spatial price indexes that measure price level differences across regions (such as states or metro areas) for a given time period (see Aten, 2006, Aten, Figueroa, Martin, 2011, and Aten, Figueroa, Vengelen, 2016). They are based on price and expenditure inputs for rents, obtained from the ACS combined with inputs for other consumption classes from the Consumer Price Index (CPI) program at the U.S. Bureau of Labor Statistics. Rents price levels derived from the ACS cover all units with complete kitchens and plumbing, but unlike the MRI, are not restricted to 2-bedroom apartments. They are quality-adjusted weighted means estimated using a hedonic model that controls for basic unit characteristics, such as the type of structure, number of bedrooms, total number of rooms, and the year the unit was built.

The RPP index used in this analysis is an aggregate price index for food, apparel and rents (FAR). It represents the relative price level of a consumption basket that is narrowly defined to the basic necessities of food, clothing, and shelter. Because it includes more than housing, the FAR is applied to the full threshold value, not just the housing share of the threshold:

$$Threshold_{ijt} = RPP_{ij} \times Threshold_t$$

where *ij* refers to the state and metro area, respectively, and *t* refers to tenure as before.

[3] National thresholds are produced by the Bureau of Labor Statistics, available at https://www.bls.gov/pir/spmhome.htm. They are also adjusted for differences in family composition using a three-parameter equivalence scale.

4. Results

Indexes and Adjusted Thresholds: The range of index values across metro and state areas is wider for the MRI than for the FAR (Table 1). This is because price levels of food and apparel vary less across areas than rents and have a dampening effect on the range of the FAR (see Aten, Figueroa, Martin, 2011). However, the MRI is only applied to a fixed proportion of the threshold, the housing share (40%-50% depending on housing tenure status). As a result, the range of adjusted thresholds is smaller for the MRI than for the FAR.

Table 1: Ranges of Index Values and Adjusted Thresholds: 2015

	Index Values		Adjusted Thresholds ($) 2 Adult/2 Child, Renters		
	MRI	FAR	MRI	FAR	
Maximum	1.81	1.47	35,944	37,487	*San Jose-Sunnyvale-Santa Clara, CA*[4]
Minimum	0.61	0.68	20,585	17,492	*Alabama – Outside of metro area*[5]
Range	1.21	0.78	15,359	19,995	

For example, San Jose-Sunnyvale-Santa Clara, CA is the metro area with the largest values for both the MRI and FAR (1.81 and 1.47, respectively). Assuming a housing share of 50%, approximately the share for renters and owners with a mortgage, the effective adjustment of the MRI is reduced to 1.41:

$$\begin{aligned} Threshold_{ijt} &= [(HousingShare_t \times MRI_{ij}) + (1 - HousingShare_t)] \times Threshold_t \\ &= [(.5 \times 1.81) + (.5)] \times Threshold_t \\ &= \mathbf{1.41} \times Threshold_t \end{aligned}$$

Weights: The main difference between the two indexes is worth emphasizing. Because the FAR is a composite index, both the relative prices of the three components as well as their relative shares vary by metro and state areas. Where the relative price of rents is high, the share of expenditures on rents tends to be higher. In the example above, San Jose's share of rents is 53%, and its rent price level is twice the national average, while Alabama's share of rents outside the metro areas is only 34%, and its rent is half the national average. The range of these shares across all geographic units is shown in Table 2.

Table 2: Ranges of Expenditure Shares for the FAR

	Food	Apparel	Rents
Maximum	0.558 WV nonmetro	0.161 WV nonmetro	0.654 FL other metro*
Minimum	0.258 FL other metro*	0.086 Urban Honolulu metro	0.281 WV nonmetro
Range	0.300	0.075	0.373

* "Other metro" refer to smaller metropolitan statistical areas, not large enough to be individually disclosed in the Current Population Survey Annual Social and Economic Supplement.

[4] The difference between the FAR threshold for San Jose-Sunnyvale-Santa Clara, CA metro area and the threshold for Urban Honolulu metro area is not statistically significant.

[5] The differences among the MRI-adjusted thresholds for non-metro Alabama and the thresholds for non-metro Arkansas, Kentucky, Louisiana, Tennessee, West Virginia, and the Johnstown, PA metro area are not statistically significant. The differences among the FAR-adjusted thresholds for Alabama outside of metro areas and the thresholds for other metro areas in Illinois and nonmetro Mississippi are not statistically significant.

In the areas outside the metro areas in West Virginia, the RPP[6] for Food is relatively high, 0.92, and that of Rents is low, 0.54, so expenditures on food take up a greater share of the total (nearly 56%) than rents (28%).

On the other hand, while the MRI housing shares do not vary by metro area, they do vary by housing tenure. The housing share for owners without a mortgage is about 40 percent, while the housing share for owners with a mortgage and renters is about 50 percent.

National and Regional Poverty Rates: Table 3 displays poverty rates estimated without geographic adjustment and those resulting from adjustment with the MRI and the FAR.[7] The table includes overall rates as well as rates by region, metro status, and tenure type. The differences between rates using the MRI and the FAR are all statistically significant.

Nationally, the adjustment with the MRI and the FAR move in opposite directions. The poverty rate increases from 14.0% to 14.3% using the MRI but declines to 13.7% using the FAR (Table 3). The MRI increases the population in poverty by 925,000 whereas the FAR decreases that population by just over a million. Regionally, the Northeast and West have higher poverty rates when adjusted by the MRI and the FAR, but lower adjusted rates in the Midwest and South.

Both the MRI and the FAR increase poverty rates relative to unadjusted poverty rates for individuals living inside metro statistical areas, whether they are inside or outside principal cities. On the other hand, both geographic adjustment mechanisms decrease poverty rates for individuals outside metro areas. Inside principal cities of metro areas the difference between the MRI adjustments and the FAR adjustments is not statistically significant. For those living inside metro areas but not in principal cities, the MRI adjustments are larger than the FAR adjustments. In contrast, outside metro areas, the bigger decrease is using the FAR, with rates going from 17.4 percent to 10.8 percent.

Poverty rates for owners with a mortgage are lower than the unadjusted rates using the FAR. Differences between the MRI poverty rates and the unadjusted poverty rates for owners with a mortgage are not statistically significant. For renters, the difference between the unadjusted poverty rate and the rate with the FAR adjustment is not statistically significant while the rate using the MRI adjustment is higher. Both the MRI and the FAR reduce poverty rates for owners without a mortgage relative to unadjusted rates.

State Poverty Rates: In 30 states, including the District of Columbia, the difference between the MRI and FAR adjustments are statistically significant. For most of these, the FAR generates a larger adjustment than does the MRI. The FAR generated larger increases in California, the District of Columbia, Hawaii, New Jersey, and New York; and larger decreases across 21 states[8]. The MRI

[6] Due to space limitations, the RPPs for the three components are not included in the paper, but are available upon request.

[7] The poverty estimates in this paper (which may be shown in text, figures, and tables) are from the 2015 and 2016 Annual Social and Economic Supplements (ASEC) to the Current Population Survey (CPS) and are based on responses from a sample of the population. They 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-percent confidence level unless otherwise noted. Standard errors were calculated using replicate weights. Further information about the source and accuracy of the estimates is available at https://www2.census.gov/library/publications/2016/demo/256/p60-256sa.pdf.

[8] These states are Alabama, Arkansas, Georgia, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Missouri, Nebraska, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas and Wisconsin.

resulted in a larger increase in just two states, Delaware and Florida. In Nevada and Rhode Island, where the adjusted thresholds are close to the U.S. average, the MRI increased poverty rates while the FAR decreased rates relative to the unadjusted rates.

Table 3. Supplemental Poverty Rates and Population by Selected Characteristics, 2015

(Population in thousands, poverty rates in percent)

Characteristic	Total Population	Supplemental Poverty Rates		
		No Geo Adjustment	MRI	FAR
Overall	318,868	14.0	14.3	13.7
Region				
Northeast	55,879	12.0	14.3	14.9
Midwest	67,115	12.4	10.7	9.6
South	120,115	16.3	15.5	13.8
West	75,759	13.4	15.7	16.3
Metro/NonMetro				
Metro - In principal city	103,740	16.4	17.9	17.5
Metro - Outside principal city	170,652	11.7	12.5	12.1
Nonmetro	44,477	17.4	13.2	10.8
Tenure				
Owner with mortgage	134,299	7.3	7.5	7.1
Owner without mortgage	77,815	13.0	12.7	11.7
Renter	106,754	23.2	24.2	23.5

Source: 2016 Current Population Survey Annual Social and Economic Supplement

Note: Differences between the MRI poverty rates and the FAR poverty rates are statistically significant for all characteristics. Differences between the MRI poverty rates and the unadjusted rates are statistically significant for all categories except for owners with a mortgage. Differences betewen FAR poverty rates and unadjusted rates are statistically significant for all categories except renters. Differences in the sizes of the MRI adjustment (MRI rate minus No Geo Adjustment) and the FAR adjustment (FAR rate minus No Geo Adjustment) are signficant for all categories except metro - in principal city.

5. Conclusions

The current measure of poverty in the United States is obtained by counting the number of people living below a national threshold or dollar value. This national poverty line is the same across all geographic areas, including urban and rural areas. The SPM attempts to address this problem by adjusting the threshold value with an indicator of price-level differences across geographic units. Two of these adjustments are shown in this analysis: the MRI for a 2-bedroom apartment and the FAR, a composite price index that measures price-level difference for Food, Apparel, and Rents, and is applied to the total value of the threshold. The advantage of this composite RPP is that it takes into account the varying distribution of the three components across geographic areas – states that have high price levels for rents will generally have higher expenditure shares on rents, and vice versa. On the other hand, the FAR does not recognize differences in expenditure patterns across tenure types.

Adjustments to national and regional poverty rates are larger using the FAR than the MRI. This is in contrast to a more broadly-based RPP used in previous research, which covers all consumption goods and services, not just apparel, food and rents (see Renwick, Aten, Figueroa, and Martin, 2014). Although the threshold adjustments are larger, the total poverty counts are lower with the FAR. This is due to the distribution of the population, with fewer people living in the combined Northeast and West areas (41%) than in the South and Midwest (59%).The geographic adjustments essentially shifts the count of number of people in poverty from the relatively less expensive but more populous regions to the more urbanized and expensive regions.

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