**Levels and Changes in Income Poverty, Consumption Poverty and Material Well-Being:
A Response to Shaefer and Rivera (2018)***

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ABSTRACT

This comment responds to Shaefer and Rivera (2018), a recent working paper that criticizes some of our published work on trends in income and consumption based poverty measures in the United States (Meyer and Sullivan, 2003, 2011a,b, 2012a,b, 2017). Shaefer and Rivera suggest that income poverty does a better job of reflecting the material circumstances of those at the bottom, basing this conclusion on three main claims: that 1) short term changes in income poverty are more closely associated with changes in other measures of well-being than are short-term changes in consumption poverty; 2) the long-run trends for income poverty align more closely with the long-run trends for other measures of well-being than do the trends for consumption poverty; and 3) the level of poverty indicated by consumption measures is unreasonably low as compared to other indicators of well-being. We show that the evidence presented in Shaefer and Rivera is misleading and incomplete. Their main evidence suffers from a problem commonly called spurious correlation or spurious regression. Simple corrections for this bias tend to reverse their key findings. Moreover, they support their arguments using a few select pieces of evidence—the broader evidence including large literatures run counter to their conclusions. A more comprehensive examination of the evidence supports the conclusion that consumption-based measures of poverty more accurately reflect the economic circumstances of those with few resources, both at a point in time and over time.

I.   Introduction

This comment responds to Shaefer and Rivera (2018), a recent working paper that criticizes some of our published work on trends in income and consumption based poverty measures in the United States (Meyer and Sullivan, 2003, 2011a,b, 2012a,b, 2017). Shaefer and Rivera suggest that income poverty does a better job of reflecting the material circumstances of those at the bottom, basing this conclusion on three main claims: that 1) short term changes in income poverty are more closely associated with changes in other measures of well-being than are short-term changes in consumption poverty; 2) the long-run trends for income poverty align more closely with the long-run trends for other measures of well-being than do the trends for consumption poverty; and 3) the level of poverty indicated by consumption measures is unreasonably low as compared to other indicators of well-being. We show that the evidence presented in Shaefer and Rivera is misleading and incomplete. Their main evidence suffers from a problem commonly called spurious correlation or spurious regression. Simple corrections for this bias tend to reverse their key findings. Moreover, they support their arguments using a few select pieces of evidence—the broader evidence including large literatures run counter to their conclusions. A more comprehensive examination of the evidence supports the conclusion that consumption-based measures of poverty more accurately reflect the economic circumstances of those with few resources, both at a point in time and over time.

Shaefer and Rivera argue that the patterns of material hardship align more closely with income poverty than consumption poverty. However, their discussion of changes over time confounds short-term associations and long-term changes. Correlations and long-term trends are different concepts that should be measured using different approaches. In this response, we consider these two different concepts separately, starting first with short-term associations.

II.   Correlations between Poverty Measures and Material Hardship

Shaefer and Rivera present in Tables 1-3 of their paper simple correlations between various poverty measures and various measures of material hardship (food insecurity, difficulty paying bills, unmet medical needs, etc.) and indicators of underemployment and unemployment for the period from 1992 and 2015. In general, the correlations between the income poverty rate (either the official poverty measure (OPM) or the Supplemental Poverty Measure (SPM)) and the indicators of material hardship that they have chosen are large and positive while those between the consumption poverty rate and their measures of hardship tend to be negative. The authors would like us to conclude that the time patterns of consumption poverty simply do not match up well with other indicators of well-being, while income poverty does quite well.

There is, however, a straightforward explanation for these findings. During the period of their analysis, it is easy to see that there is an upward trend in the income poverty measures and a downward trend in consumption poverty (see Figure 2 in their paper). In the presence of trending variables, short-term associations between variables should be analyzed allowing for a time trend. This point is the subject of a classic paper by Granger and Newbold (1974), who refer to analyses that leave out a time trend (as done by Shaefer and Rivera) as "spurious regressions" because they can easily find a correlation between two variables when there is no true relationship or hide one when it is present. What Shaefer and Rivera have done is a classic example of a spurious analysis.

Not surprisingly, the main findings change dramatically when we correct their analyses by estimating simple multivariate regressions that include a linear time trend (Tables 1 and 2). Table 1 presents the results for the material hardship and labor market measures reported by Shaefer and Rivera. After allowing for a time trend, all of these outcomes are now positively

related to consumption poverty, and in many cases the magnitude of the standardized regression coefficient for consumption poverty is larger than that for the OPM or SPM. In the cases of "Difficulty with Rent/Mortgage" and "Difficulty Seeing a Doctor", the point estimates are larger for consumption poverty and one can reject the hypothesis that these estimates are the same as those for the OPM or SPM. The reverse is true only for Food Insecurity.

We expand these analyses by considering other, less subjective indicators of material well-being such as the characteristics of the living unit and car ownership (Table 2). These outcomes are calculated using data on housing characteristics from the American Housing Survey and on vehicle ownership from the Consumer Expenditure Survey for a sample of households in the bottom quintile of the income distribution in that year. The results indicate that, once we allow for a time trend, these measures of well-being tend to be more closely associated with consumption poverty than the OPM or SPM. Of the 13 different outcomes, 12 of them appear to be more strongly related to consumption poverty than to the OPM or SPM based on the magnitude of the standardized regression coefficients, and in eight of these cases the point estimate for consumption poverty is significantly different from that for income poverty. For the SPM, nine of the 13 estimates have the wrong sign.

It should be noted that neither the OPM nor SPM is designed to capture absolute changes in material deprivation. The OPM intentionally omits most of our policies designed to help the poor—by relying on pre-tax money income it doesn't count SNAP, the EITC, the Child Tax Credit or public and subsidized housing and other benefits. The SPM is a relative poverty measure, not one designed to capture absolute deprivation. The cutoffs to determine poverty move in a complicated way with the spending levels of those between the 28th and 33rd percentiles of spending.

In a robustness section, Shaefer and Rivera calculate correlations of the first differences of their poverty measures and other indicators of well-being, which is another approach used to account for time trends. These first-difference results indicate that the relationship between consumption poverty and other measures of well-being are comparable to the relationship between income poverty and these other measures. The one exception is Food Insecurity, where consumption poverty continues to have the wrong sign in the first difference model. Despite the evidence that their main results are highly sensitive to whether they account for a time trend, the authors downplay their first difference results: the estimates are reported in an appendix table, and the abstract and conclusions make no mention of the fact that all of their correlations are highly sensitive to controls for a time trend. The authors argue that the first-difference results are unreliable because they are not consistent with the long-term trends, but this argument confuses long-run changes and short-term associations when accounting for a trend.

In previous work, we conducted a thorough examination of the short-term relationship between income and consumption poverty and economic conditions, such as the unemployment rate and GDP, over five decades (Meyer and Sullivan 2011). We examined the relationship between income and consumption poverty and economic conditions at both the national and regional level, specifying economic conditions several different ways. We found that both income and consumption poverty are sensitive to macroeconomic conditions. One might expect that income would be more strongly related to the business cycle than consumption given that consumption reflects more long-term prospects and is known to be less subject to shocks than income. However, the evidence on whether income is more responsive to the business cycle than consumption is mixed. Income poverty does appear to be more responsive using national level

variation, but consumption poverty is often more responsive to unemployment when using regional variation.

III. Comparing Long-run Trends in Poverty Measures and Well-being

To support their claim that income poverty does a better job of reflecting the material circumstances of those with few resources, Shaefer and Rivera also present the long run patterns of income and consumption poverty and for a few material hardship measures. These patterns, which they present in Figures 2 and 3 of their report, suggest that the long-term changes in consumption poverty are out of line with the other indicators. This discussion, however, presents the patterns for a very select, small number of indicators that do not capture the overall extent of material circumstances. The authors emphasize a few subjective measures that capture households' views about whether they have enough income, as well as their organization and planning, not just their material circumstances.

The relationship between these hardships and material circumstances is not well understood. For example, presumably, food insecurity reflects nutritional well-being to some degree, but research indicates that the relationship between food insecurity and nutrition can be weak. Bhattacharya et al. (2004) found that food insecurity was not strongly related to nutritional outcomes for some groups. Ultimately, they concluded, "researchers should be cautious about assuming connections between food insecurity and nutritional outcomes, particularly among children."

The food security measure that is emphasized the most in Schaefer and Rivera displays an unusual time series pattern—remaining roughly constant and then jumping by a magnitude

much greater than any previous or subsequent change in one year at a time that does not match the change in economic conditions. Virtually all the rise in food insecurity occurs in 2008, but unemployment rose much more between 2008 and 2009 (60 percent) than it did between 2007 and 2008 (26 percent). Moreover, as unemployment fell from 2011 through 2013, there was little decline in food insecurity. The time series for food insecurity looks like a step function, taking on roughly two values—one before 2008 and one after. This pattern does not fit the deepening and then recovery from the recession.

While the long-term trend of declining consumption poverty is distinct from the trends for income poverty and for the narrow set of material hardship measures that Shaefer and Rivera report, there are many other indicators of well-being that show that the circumstances of the worst off in the U.S. have improved appreciably over the past few decades. For example, Currie and Schwandt (2016) document improvements in mortality at all ages by percentiles of the county poverty rate, and Pinker (2018) shows overall reductions in mortality due to work accidents, drownings and fires. As we have shown in other work, those in the bottom twenty percent of the income distribution now live in housing that is nicer in many respects than the housing of the middle class of the 1980s (Meyer and Sullivan 2018). The number of rooms, square footage, air conditioning, presence of a dishwasher, lack of peeling paint or plumbing problems and other indicators all have sharply improved for those in the bottom income quintile. There have also been long-run improvements in health insurance coverage (Zammitti et al. 2018) and car ownership.

If one compares the long-run patterns for these objective measures of material well-being to the trends for income and consumption poverty, it is now income poverty that appears to be inconsistent with the other patters. Using data from the American Housing Survey, in Figure 1

we report the changes since 1989 in the housing characteristics for households in the bottom quintile of the income distribution in each year. For comparison, we also report changes since 1989 in the OPM and in consumption poverty. Between 1989 and 2015, the OPM rose slightly, while all the other measures indicate improvement. During this same period, consumption poverty fell by 66%, the fraction of low-income households without air conditioning fell by 69%, the fraction of low-income households living in a house with peeling paint fell by 53%, and the fraction with a water leak fell by more than 30%. These patterns, as well as many others documented in the literature, indicate improved material circumstances over the past few decades for individuals and families with few resources—patterns that are quite consistent with those for consumption poverty.

IV.   Comparing Levels of Poverty and Material Hardship

Shaefer and Rivera also claim that the level of consumption poverty is not in line with other indicators of well-being at the bottom. To show this they present in their Figure 1 the consumption poverty rate (anchored in 1980) from Meyer and Sullivan (2017), the official and SPM rates, as well as measures of material hardship, underemployment, and unemployment for 2011. The consumption poverty rate, which was 4.2%, is the lowest level of all the indicators. They emphasize this sharp difference stating, "the rate of consumption poverty…is two to four times lower than the rates of food insecurity and the primary SIPP material hardship outcomes."

The argument that the authors make based on their Figure 1 fails to recognize that the level of poverty in any given year is arbitrary; it depends on where one specifies the threshold for poverty. The rate they report in Figure 1 is based on a consumption poverty rate that we calculate

using thresholds that match the official poverty rate in 1980.[1] This anchoring of poverty rates facilitates comparisons of trends across different measures of poverty. It allows us to examine the same point of the distribution in 1980 so that different measures do not diverge simply because of differing changes at different points in the distribution of resources.

As we emphasize in the study from which Shaefer and Rivera obtained the consumption poverty estimate (Meyer and Sullivan, 2017), the setting of poverty thresholds is inherently arbitrary. We also emphasize this point in several other papers (Meyer and Sullivan 2012a, 2012b). In fact, we highlight this point in Meyer and Sullivan (2017), reporting consumption poverty rates over five decades using two different sets of thresholds—one anchored in 1980 and one anchored in 2015. This arbitrary decision can have a very significant effect on the level of poverty at a point in time, but typically has much less of an effect on changes over time. Recognizing the inherent arbitrariness of poverty thresholds at a point in time, our work focuses on changes in poverty over time.

Shaefer and Rivera chose to report the consumption poverty rate that, at a particular point in time, is lower than other indicators of hardship. If, on the other hand they had reported our consumption poverty rate that is anchored in 2015, the rate would have been 16.1%, which is greater than or equal to all the other indicators of well-being except the SPM, completely reversing the key point the authors were making in their Figure 1.

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[1] To calculate a poverty rate that is anchored in 1980, we proportionately scale the thresholds in 1980 so that the consumption poverty rate and the official poverty rate are the same in that year. We then determine the thresholds in all other years by adjusting these thresholds to account for inflation over time. Because our inflation adjustment accounts for well-documented bias in the CPI-U, our thresholds rise more slowly over time, resulting in a poverty level that is much lower than the official measure in recent years.

V.   Other evidence on the Validity of Income and Consumption Data

In the last section of their paper, Shaefer and Rivera speculate on possible explanations for why income and consumption poverty patterns are different, such as measurement error in consumption or borrowing and saving behavior. This discussion makes no mention of a large literature that has explored these and other related issues in detail.

In previous work, we present evidence that indicates that consumption is more accurately reported than income for the most disadvantaged families (Meyer and Sullivan 2003, 2011). The bottom deciles of expenditures significantly exceed those of income, suggesting under-reporting of income. The under-reporting rate for government transfers is high and rising. While consumption data also suffer from some under-reporting, it is not as severe as that for income and alternative methods using the well-measured components can be used to check results. Moreover, low consumption is a much stronger predictor of disadvantage than low income. In particular, material hardship and other adverse family outcomes are more severe for those with low consumption than for those with low income (Meyer and Sullivan 2003, 2011).

Similar patterns are evident from comparisons of the characteristics of the consumption poor and the income poor. In related work, we have shown that a consumption poverty measure selects those who are more disadvantaged (Meyer and Sullivan, 2012a). As compared to the income poor, those who are consumption poor are less likely to graduate from college, have health insurance, own a home, and have durables in their home such as a washer, dryer, or dishwasher. Substantial work besides our own argues for consumption as a better measure of well-being (Poterba 1991; Slesnick 1993, 2001; Fisher, Johnson and Smeeding 2014).

The evidence of the deterioration in the quality of income data from surveys and the importance of under-reporting of various types of income continues to rise. Some recent work shows that incorporating administrative measures of some types of income that are badly reported in our standard survey sources has a very large effect on measured poverty rates (Bee and Mitchell 2017, Meyer and Mittag forthcoming). In fact, work in progress indicates that when one corrects misreported income, income and consumption poverty rates using the same thresholds are fairly similar at a point in time (Meyer and Wu, in progress).

VI.   Conclusions

Shaefer and Rivera make a number of claims that suggest income poverty more accurately reflects the level and changes in well-being at the bottom than consumption poverty. In this comment, we show that the evidence they present is misleading and incomplete, and that simple corrections for bias in their analyses tend to reverse their key findings.

Their conclusion that income poverty is a more accurate measure would lead one to believe that no progress has been made in improving the economic circumstances of the poor over the past forty years. The official, income-based poverty rate in 2016 was 12.7%, a percentage point higher than it was in 1976. This spurious conclusion can be (and has been) used as a scathing critique of existing anti-poverty programs. In fact, many policymakers have used just this evidence to conclude that our social safety net has failed.

When reasonable adjustments are made to address well-known flaws in the official poverty measure, the story is quite different. In Meyer and Sullivan (2017) we show that a poverty rate based on consumption, and that is adjusted to correct for bias in the official price

index, fell sharply over the past four decades. This decline is consistent with other research showing improvements in material circumstances at the bottom. The combination of the safety net and economic growth has meant that many fewer people experience material deprivation than in the past. Understanding the nature of this progress and who is in greatest need is essential when designing effective anti-poverty policy.

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Table 1: OLS Estimates from Hardship or Employment Measures Regressed on the Poverty Rate and a Linear Time Trend

| Regressors	OPM	SPM	Consumption Anchored 1980	Consumption Anchored 2015
Dependent Variable				
Food Insecurity (1998-2015)	0.943	0.971	0.048	0.233
	(0.179)	(0.208)	(0.385)	(0.334)
Difficulty with Essential Expenses (1992-2011)	0.596	0.711	1.269	1.270
	(0.247)	(0.362)	(0.913)	(1.040)
Difficulty with Rent/Mortgage (1992-2011)	0.937	1.225	2.528	2.564
	(0.121)	(0.109)	(0.464)	(0.761)
Difficulty with Utilities (1992-2011)	0.788	1.008	1.958	1.788
	(0.264)	(0.350)	(0.913)	(1.195)
Difficulty Seeing a Doctor (1992-2011)	0.887	1.179	2.466	2.465
	(0.172)	(0.151)	(0.447)	(0.778)
Unemployment Rate (1998-2015)	1.090	0.324	0.379	0.543
	(0.253)	(0.261)	(0.472)	(0.401)
Unemployment given less than HS (1998-2015)	1.139	0.306	0.349	0.516
	(0.259)	(0.273)	(0.491)	(0.419)
Part-time employment for Economic Reasons (1998-2015)	1.019	0.487	0.556	0.619
	(0.152)	(0.181)	(0.360)	(0.302)

Notes: Standard errors are in parentheses. Standardized coefficients are reported to facilitate comparisons across columns. Data are from Shaefer and Rivera (2018) and Meyer and Sullivan (2017).

Table 2: OLS Estimates from Regressions of Housing and Other Characteristics for the Bottom Income Quintile on the Poverty Rate and a Linear Time Trend

Regressors	OPM	SPM	Consumption Anchored 1980	Consumption Anchored 2015
Dependent Variable				
Number of rooms (adjusted for household size)	-0.514	-1.053	-1.566	-1.892
	(0.240)	(0.309)	(0.576)	(0.471)
Square footage of unit (categorical)	-0.517	-0.777	-2.264	-3.003
	(0.813)	(0.491)	(0.679)	(1.030)
Water leak from the inside in the last 6 months	-0.046	-0.096	1.656	2.156
	(0.602)	(0.984)	(0.119)	(0.478)
Water leak from the outside in the last 6 months	0.248	0.530	1.758	2.109
	(0.645)	(0.959)	(0.396)	(0.955)
Unit does not have central air or air conditioning	0.126	-0.267	0.992	1.030
	(0.198)	(0.275)	(0.154)	(0.281)
Unit does not have air conditioning	0.043	-0.229	0.896	0.885
	(0.193)	(0.422)	(0.176)	(0.326)
Unit does not have a dishwasher	-0.170	-0.249	0.702	0.893
	(0.264)	(0.328)	(0.272)	(0.437)
Unit does not have a clothes dryer	-0.193	-0.201	0.993	1.343
	(0.367)	(0.574)	(0.302)	(0.418)
Unit does not have a clothes washer	-0.509	-0.323	1.081	1.621
	(0.430)	(0.831)	(0.782)	(0.944)
Toilet breakdown in last 3 months	-0.262	-0.432	0.374	-0.322
	(0.444)	(0.413)	(1.298)	(1.448)
Large section of peeling paint in the unit	0.052	-0.833	1.176	0.907
	(0.319)	(0.229)	(0.590)	(0.850)
Person does not own a car	0.193	-0.640	1.829	2.032
	(0.413)	(1.254)	(0.255)	(0.458)
Person does not own multiple cars	0.899	0.318	1.821	2.063
	(0.243)	(0.562)	(1.005)	(1.193)

Notes: Standard errors are in parentheses. Standardized coefficients are reported to facilitate comparisons across columns. Housing characteristics are from the American Housing Survey and vehicle ownership and consumption poverty are from the Consumer Expenditure Survey. The official poverty measure is reported by the U.S. Census Bureau and the SPM is from Shaefer and Rivera (2018). Because actual square footage is not available in many years, we use a categorical variable ranging from 1 (less than 500 square feet) to 9 (over 4,000 square feet).

Figure 1: Changes since 1989 in Consumption Poverty, Income Poverty, and Bottom Income Quintile Housing Characteristics
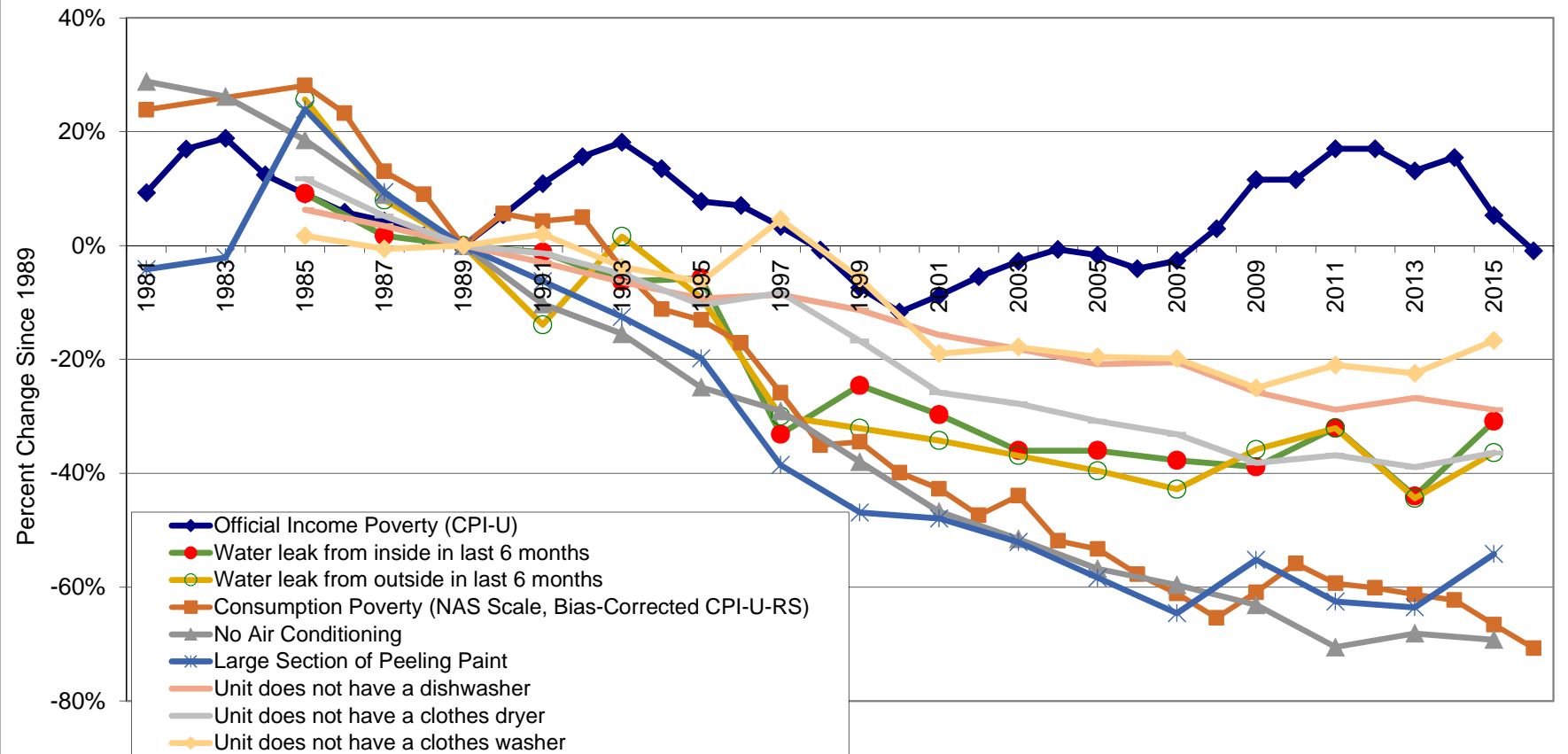
Notes: Official Income Poverty follows the U.S. Census definition of income poverty using official thresholds. Housing characteristics come from the American Housing Survey. See text for more details.