Counting the Poor: The Liquidity-Adjusted Supplemental Expenditure Poverty Measure

Sung Ah Bahk* John Fitzgerald† Robert Moffitt ‡

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*American University
†Bowdoin College
‡Johns Hopkins University

Abstract

Most countries use income to measure available resources when calculating household-level poverty status.Â We introduce a new measure using household expenditure instead, showing that expenditure is the theoretically correct measure of resources transferred into a period in the life cycle, including borrowing used to finance expenditure, unlike income.Â We also provide a new treatment of durables, calculating their service flows but adjusting for their illiquidity and required maintenance.Â Quantitatively, poverty rates using our measure differ markedly from those from an income measure.Â We extend our measure to deal with transfer payment impacts, Â transportation, and other significant issues in poverty measurement.

Key words: Poverty, Expenditure, Transfers

JEL codes: D12, H23, I32

All major industrialized countries calculate rates of poverty in their societies, examine both levels and trends in those rates, and estimate how much public anti-poverty programs reduce poverty rates. Many different methods are used but the dominant measure of how much resources a household has is its income in a period, though often modified in various ways (after-tax and after transfers, for example, and sometimes deducting various expenses). Different countries use different poverty thresholds–that is, poverty lines that determine the level of resources a household must have to not be poor–as well.

In this paper we propose a new poverty measure we term the Liquidity-Adjusted Supplemental Expenditure Poverty Measure, or L-SEPM. We use the Supplemental Expenditure Poverty Measure term to mimic the name of the most widely used measure in the U.S., the Supplemental Poverty Measure produced by the U.S. Bureau of the Census. But we insert the word "expenditure" because that is the measure of resources we use. We use the word "liquidity" because one of our principal contributions is on the treatment of illiquidity of resources when dealing with durables and in-kind government transfers. And, while many of our contributions are aimed at developing a theoretically superior measure of resources, we also propose making adjustments to the poverty threshold to account for the illiquidity of durables and in-kind transfers. Our new measure uses an internally consistent definition of the threshold and resources, with liquidity-adjusted thresholds defined as the amount of liquid resources needed to purchase the minimum bundle of goods needed to not be poor, and with liquid resources defined as resources that can be used to purchase any good in the threshold (unlike service flows from durables and in-kind transfers). With our new measure of resources and our new measure of the threshold, we compute the L-SEPM poverty rate in the usual way, by counting the fraction of households with insufficient resources to purchase the consumption bundle denoted by the threshold.

While we make several contributions to the literature on poverty measurement, our first and most important conceptual change is, as just emphasized, to replace income as the measure of

resources with expenditure. We note that the well-known life cycle model of two-stage budgeting implies that the correct measure of resources used in a single period is the amount of lifetime resources transferred into that period, and that that amount is per-period expenditure. Unlike income, expenditure includes resources used in a period from drawdowns of assets–i.e., transfers from past resources into the present–as well as credit card borrowing, payday loans, and borrowing from other sources, including from friends and family–i.e.,transfers of future resources into the present. Also unlike income, expenditure excludes the repayment of loans from earlier periods. Expenditure hence captures all sources of potential resources actually used to purchase goods and services, including those goods and services deemed necessary to not be poor. Empirically, we show that income does not equal expenditure for households at the bottom of their distributions and that the difference between the two is highly correlated with borrowing.

Current-period income does include saving, however, and current-period expenditure does not. But saving represents a measure of potential resources, not a measure of resources actually used, which is the concept we employ. Unused but potential resources should include not only current-period saving but also all future and past income which can be drawn into the present period. Using current-period expenditure, in contrast, represents an internally consistent measure of actual resources used and has the virtue of corresponding to a clean theoretical concept, unlike current-period income. We leave the difficult task of measuring potential resources to future research with a multi-period model and explore, in our paper, the implications of using resources actually used in a period for the calculation of levels and trends in the rate of poverty instead. And our empirical results provide strong evidence that income is not equal to expenditure for low-income households, with consequent implications for the poverty rate, giving substance to our new approach.

A second contribution we make is to deal with durables in a theoretically correct way, addressing their intrinsic illiquidity. Durables are important in the low income population, with an average of 47 percent of the bottom quintile of the expenditure distribution owning a home and 73 percent owning a vehicle over the years 2009-2022. The conceptually correct way to deal with

durables is to estimate their service flows, and this has been proposed for use by the Census Bureau for its income poverty measure (Ziliak et al. (2023)). The Census Bureau currently deals with durables in a different way, as we will explain in the relevant section of our paper. But service flows are by definition illiquid and cannot be used to satisfy any consumption need other than that for the good representing the flow. Further, if the poverty threshold is defined as a bundle of specific goods that must be consumed to achieve a minimum standard of living, the illiquidity of service flows from durables affects the ability of a household to consume the other items in the bundle and hence to escape poverty. We argue that the correct way to deal with this illiquidity is to exclude service flows from liquid resources, for including them in resources would treat a household with $10,000 in cash and $10,000 in illiquid service flows the same as a family with $20,000 in cash. We instead adjust the poverty threshold by reducing the amount of consumption needed to purchase the necessary amount of the good in the minimum bundle by the magnitude of the service flow. In addition, we argue that contractually obligated payments for durables (home mortgages, vehicle loans) are likewise illiquid in the sense that they cannot be used for the purchase of other goods in the minimum bundle and hence should not be included in liquid resources, which we define to be resources that can be used to purchase any consumption good.

A third, and related, contribution is to deal properly with in-kind transfers, which have grown over time in the U.S. and are a prominent component of the U.S. government safety net system. In-kind transfers are essentially consumption subsidies and are usually added to resources because they represent an addition to a household's implicit income. But in-kind transfers are, like durable service flows, entirely illiquid (absent a black market) and cannot be used for the purchase of any item in the minimum bundle other than that for the good being subsidized. We show that a conceptually preferable way to deal with in-kind transfers is again to make an adjustment to the threshold and not to include those transfers in resources. However, this issue is widely understood in the literature and hence is not a major contribution of our study, but we emphasize that it is motivated by the same issue as for durables and should be treated the same way.

A fourth contribution we make is in the calculation of how government transfer programs

affect poverty rates and how much those rates would rise if transfers were taken away. The universal approach to this problem in the literature is to simply remove transfers from resources and to recalculate the rate of poverty. However, when taking an approach based on expenditure, the literature on household finance showing that transfers provide an important source of insurance to low income families should be considered. But that insurance is not necessarily full, for some households, particularly those with non-trivial resources and not at the very bottom of the distribution, have other sources to draw upon in the case of a negative transitory shock to resources. This means that expenditure in the absence of transfers would not fall by the full amount of the transfer and hence poverty rates would not rise as much as usually calculated in the literature. In addition, to the extent that, in the absence of transfers, some households (though probably not those, again, at the very bottom) would do more precautionary saving than they do in the presence of transfers, expenditure for those families would be lower than it is in the presence of transfers. But this would raise poverty rates to the extent that lower expenditure moves some families below the poverty threshold. These two forces go in the same direction–implying smaller increases in the rate of poverty in the absence of transfers–and we provide an illustration of how they might affect poverty rates.

We construct our new L-SEPM poverty measure incorporating all these contributions using the Consumer Expenditure (CE) Survey for our work instead of the Current Population Survey (CPS), which is the most widely-used data set for income-based poverty measures. We show poverty rates using our new expenditure measure and how adjustments for the illiquidity of durable service flows and illiquid expenses affect those rates, how the illiquidity of in-kind transfers affects poverty rates, and how the impact of transfer payments affect poverty rates is changed when accounting for insurance and precautionary savings effects. We also show how all these impacts are changed if a higher or lower threshold is used, since the distribution of durables, in-kind transfers, and transfers in general differ in different regions of the expenditure distribution. We demonstrate as well how trends in poverty rates are affected by our new adjustments, since the importance of durables, in-kind transfers, and transfers in general may have changed over time.

An additional contribution is to add a transportation consumption need to the threshold, as has been often proposed but not implemented, but which is needed if vehicles are to be included in the calculation of poverty rates. In all our exercises, we compare our expenditure-based poverty rates, both in levels and trends, to those using an income-based measure.

We calculate our L-SEPM poverty rate in 2009 to have been 9.0 percent and the income poverty rate to have been 10.4 percent, over a percentage point higher. We show that ignoring housing service flows and ignoring housing expenses would raise the poverty rate by almost two percentage points but that ignoring the illiquidity of in-kind transfers would have little effect because they are mostly inframarginal. We also find that using the Census Bureau expenditure threshold would lower the rate of poverty but that the differing shapes of the left tail of expenditures and income are the main reason for the higher income poverty rate. Our results show that both rates have fallen over time but that income poverty rate is still higher than our expenditure poverty rate by the final year of our data, 2022. We calculate the impact of using higher and lower thresholds on the comparison of the two measures, and find major differences: at lower thresholds, income poverty is dramatically higher than expenditure poverty but that, at higher thresholds, their relationship is reversed, with expenditure poverty higher than income poverty. We show that this pattern is again a result of different shapes of their distributions. In our illustrative study of the counterfactual estimates of the effects of transfers on expenditure poverty, we find that, in the absence of transfers, the rate of poverty could rise by somewhat less than if insurance and precautionary savings effects were ignored, but that the increase in poverty could still be quite large. In a study of adding a transportation need to the threshold in order to properly account for the effect of durables, we find that adding such a transportation need could raise the poverty rate by about two percentage points.

A final section of our paper compares our expenditure poverty measure to that using a consumption measure. Consumption poverty measures are conceptually different than resource-based measures because consumption measures are intended to measure material well-being in a period, not resources used or available, and the two can differ for that reason

alone. For example, consumption measures exclude purchases of investment goods but those are included in any resource-based measure like our expenditure measure because those resources could have been spent on the goods in the minimum bundle. Service flows from durables are typically included in consumption for poverty measurement but their illiquidity affects their availability for expenditure on the minimum bundle. These factors operate in opposite directions, with full liquidity lowering the poverty rate but with the exclusion of investment expenditures raising the rate. On net, the latter dominates, and we calculate consumption poverty to be above expenditure poverty. However, both measures decline at similar rates over the 2009-2022 period.

Our work builds on the large and important body of existing literature on poverty measurement, including a few using expenditure. A number of authors (Cutler and Katz (1991),Slesnick (1993)) have used expenditure instead of income for poverty measurement, but have intended it to proxy consumption but that is, again, a different measure conceptually. Armstrong et al. (2022) constructed an expenditure poverty measure but did not make any of the adjustments we discuss and used a different threshold concept. Our measure is related to that proposed by Fitzgerald and Moffitt (2022) but that paper was only an informal proposal for the use of expenditure and did not provide a theoretical basis for its use, it treated durables and in-kind transfers incorrectly, ignored liquidity issues, and used the standard method of calculating the effects of transfers on poverty instead of the one that we argue should be used. Our paper goes far beyond the informal analysis reported by those authors and the four contributions we listed above were not considered in that work. Several of our proposals are related to those in a recent report of the National Academy of Sciences, Engineering, and Medicine (Ziliak et al. (2023)) but that report was about the standard income-resource based poverty measure, which is different than our measure. We should also emphasize that the modern literature on poverty measurement draws on the foundational work and conceptual framework of Citro and Michael (1995) and its subsequent implementation and continuous improvement by the U.S. Census Bureau and U.S. Bureau of Labor Statistics, and our paper is heavily influenced by that tradition.[1]

[1]The important early study of Ruggles (1990) also expressed many of the ideas contained in Citro and Michael (1995)

The outline of the paper is as follows. In the first section, we exposit the theoretical basis for our four contributions and argue that the data support an interpretation using that theory. The following section discusses the data we use and how we construct our variables, followed by a section with our central results and a comparison of the poverty rates obtained using our measure and those using an income-based measure. We then show the effect of introducing a transportation need to the threshold, to be able to account for vehicles in the poverty calculation, and then include a short section comparing poverty rates using our measure to those using a consumption measure. A brief summary and recommendations for future work, where we emphasize that different poverty measures have different strengths and weakness but that our new measure has notable strengths, ends the paper.

I Addressing the Issues

Two-Stage Budgeting. The development of the two-stage budgeting model is usually ascribed to Gorman (Gorman (1959), Gorman (1968)) who made a weak-separability assumption on the goods in the static one-period utility function to be to able estimate demands for subgroups of goods using for the income term the value of expenditure allocated to each group. MaCurdy (1983) and Blundell and Walker (1986) extended it to the life cycle model using a time-separable utility function, and it has been used many times since. While the goal of the life cycle application is primarily econometric, allowing estimation of within-period demand functions as a function of prices in that period and total expenditure allocated to that period, we use it only to note that it implies that total expenditure in a period, not income received in a period, is the proper theoretical concept to measure actual resources chosen for a period. Showing this is straightforward but we use it to introduce some additional features relevant to low income households.

The standard form of the model assumes the utility function to be

$$\sum_{t=1}^{t=T} \beta_t U(C_t) \tag{1}$$

where T is the time horizon, β_t is the discount rate, and C_t is a composite nondurable consumption good. The standard financial flow equation is

$$A_t = (1 + r)A_{t-1} + Y_t - C_t \tag{2}$$

where A_{t-1} is liquid assets at the beginning of period t, r is the interest rate, and Y_t is labor income. Labor income and consumption are assumed to occur at the end of the period. A liquidity constraint restriction is usually added.

In the two-stage budgeting model, eqn(2) is rearranged to give

$$C_t = Y_t + rA_{t-1} + (A_{t-1} - A_t) \tag{3}$$

showing that nondurable consumption equals labor income plus interest on beginning-of-period liquid assets plus any drawdown of assets minus any saving (Blundell and Macurdy (1999)).[2] Our simple observation is that the RHS of eqn(3) represents resources allocated to the period, but none of those variables need be in the data set to measure the amount of resources allocated to the period because total expenditure in the period is equivalent to it. Only data on expenditure are needed.

However, defining A_{t-1} as liquid assets at the beginning of period t ignores the asset value of borrowing power. Low-income families have a variety of sources from which to borrow to finance current expenditure, such as credit-card borrowing, payday lending, and informal loans from friends and family, for example. All can finance current expenditure if the amount borrowed is greater than the interest paid and the value of repayments in the current period on past debt. To add these to the expenditure flow equation, we stay notationally consistent with the notation for liquid assets and formulate the accumulation of this form of debt as equivalent to the drawdown

[2]This accounting identity has been well-known since Haig-Simons and does not depend on the two-stage budgeting model or any model, since it is an identity. But couching it in that model makes clear that it can be cleanly interpreted in terms of a well-defined behavioral model reflecting utility-maximizing life cycle choices. We also note once more that this ignores potential resources that could in principle be drawn into the current period, e.g., that a household could, if it wished to, draw down all its assets to zero and put it all into current expenditure.

of an asset. Defining M^o as the maximum credit available from these "other" sources at time t (e.g., the credit limit on a credit card, assumed to be time-invariant for simplicity), B_t as balance at the end of period t, and m^o as the minimum payment toward the balance (interest and minimum repayments) expressed as a fraction of the balance, $A_t^o = M^o - B_t(1 + m^o)$ is the value of such borrowing power at time t which can be drawn upon for current expenditure. Relabeling financial assets as A_t^f, the financial flow equation becomes

$$C_t = Y_t + rA_{t-1}^f + (A_{t-1}^f - A_t^f) + (A_{t-1}^o - A_t^o) \tag{4}$$

Credit card "revolvers" (the term for those who charge the same amount every period and always pay it off the the next period) have no change in the credit card asset value (as well as those who do not have a balance in either period), while others are net borrowers or net savers, with consequent rises or falls in current expenditure, respectively. Other forms of borrowing have the same interpretation. Again, total expenditure (C_t) is equal to resources drawn into the current period from all sources, and the latter need not be measured if total expenditure can be.

It is important to emphasize that borrowing creates future debt and that, in future periods, households may lower their expenditure on goods and services to pay off that debt, which could raise the poverty rate, depending on resource levels in those future periods. It can be of course be optimal to transfer resources from the future to the present for many reasons but, at any given point in time, the population will include both those whose borrowing raises their expenditure above income as well as households who are paying off debt, making their expenditure on goods and services fall below income. The effect on our expenditure poverty measure will reflect the net effect of these two types of households and the distribution of their expenditure in the neighborhood of the poverty threshold.

Expenditure differs from labor income if any of the terms other than Y_t in eqn(4) differ from zero. It differs from total income if any of the terms other than Y_t and rA_t^f differ from zero.[3]

[3]We ignore government taxes and transfers for simplicity.

To assess the empirical importance of the difference in income and expenditure, Figure 1 shows the consumer-unit distribution of each in the Current Expenditure Survey (CE) data we use, for the years 2009-2022 (data details reported in the next section). The distributions are clearly very different with income having both a larger left tail and larger right tail, and with expenditure having larger mass in the middle ranges. For poverty measurement, the relevant portions of the two distributions are those below some poverty-defined threshold, and it is clear that the portion of the population below any given threshold will generally differ for the two.

However, much of the difference in the distributions of income and expenditure is undoubtedly the result of measurement error in income, which has been shown to be significant for the lower income population in national surveys, especially in the Current Population Survey. Much less work has been done on underreporting of income in the CE, but it has been shown to be significant by Meyer and Sullivan (2012), Meyer and Sullivan (2015) and Passero (2009), with underreporting particularly significant for transfers, self-employment earnings, and help from family and friends. At the same time, the reporting of expenditures in the CE has been shown to be much more accurate than the reporting of income and that misreporting of expenditure is, if anything, worse at the top of the distribution than at the bottom (Sabelhaus et al. (2015), Bee and Mitchell. (2017)).

But this does not imply that borrowing or drawdown of liquid assets might not explain part of the difference in income and expenditure. The Survey of Consumer Finances (SCF) finds that 97 percent of households in the bottom quintile of the income distribution in 2022 held financial assets, with a median holding of $1,400 for those with such assets (Board of Governors of the Federal Reserve System (2025b)). The same survey reports that 33 percent of those in that bottom quintile have credit cards, with a median balance of $1,400 for those who have a balance (Board of Governors of the Federal Reserve System (2025a)).[4] In fact, Mann (2009) reports that the ratio of credit card debt to income is higher in the bottom quintile than for those with higher incomes.

[4]Han et al. (2022) report similar numbers and argue that they are not large enough to explain the difference in income and expenditure at the bottom of the distribution and that reporting error in income has to be the source of the difference. Our argument is that both play a role.

In addition, the payday industry has grown dramatically over the last two decades to a $45 billion loan volume industry (Agarwal et al. (2016)). Despite their well-known usurious interest rates, they are heavily used by low income consumers, and 63 percent of users take out such loans to pay regular, recurrent monthly bills and expenses (Martin (2010)). The only nationally representative evidence on such loans is again from the SCF, which shows that between 4 and 5 percent of household heads in the bottom quintile of the income distribution make at least one payday loan every year. Evidence on informal loans from friends and family is even less available, but numerous ethnographic and qualitative accounts stress the importance of this source of liquidity to low income households. For informal lending, one ethnographic study examining the financial lives of low income households found that 95 percent had some kind of informal arrangements, with 40 percent borrowing from friends and family (Morduch and Schneider (2017)).

Further support for the role of liquid assets and credit cards is provided in Table 1, which shows data on liquid assets and credit card balances from the CE, but stratified by expenditure relative to the Census Bureau's SPM poverty threshold (defined in the next section) and separately by age of the consumer unit head. Each panel in the table shows the assets and credit card balances for those whose expenditure falls below 50 percent of the threshold (called Deep Poverty in the literature), 50 to 100 percent of the threshold (Shallow Poverty), and 100 to 150 percent of the threshold (Near Poverty). Percents of households falling into these three brackets are commonly shown in the literature, and we will also report them below. The 2022 weighted threshold used by the Census Bureau is almost $30,000 for a family of four, and the threshold for those classified as so-called "near poor" households is $45,000, both high enough that that some non-trivial potential credit potential card borrowing and assets are available. We also show, for comparison, the values for higher expenditure families.

While median assets and credit card balances are zero or near-zero for all units with expenditure below 150 percent of the poverty threshold, the 75th percentile of the liquid asset distribution for those in Near Poverty is $892 and the 90th percentile of those in Shallow Poverty is $1,419 and equal to $4,596 for those in Near Poverty, all high enough to make a difference to

expenditures of households in those ranges if drawn down for current use. Likewise, the 90th percentile of credit card balances for the Near Poor with heads under 65 is a non-trivial $2,143. Liquid assets for those with heads over 65 are much larger, where the 90th percentile for even those in Deep Poverty is $1,027, $5,648 for the Shallow Poor, and $21,444 for the Near Poor. What matters for poverty measurement are not medians, which are typically quite low for these households, but rather whether the tails of the distributions are large enough to allow some fraction of households to draw enough funds down to escape poverty. Assets are known to have large right tails, and these data are consistent with that known feature.

The credit card balances are typically smaller, and it is unknown how much debt is paid off each period (because it is not measured in the CE), so the figures in Table 1 do not necessarily represent a net increase in expenditure. Nevertheless, the 90th percentile points of the distribution are nonzero for those in Shallow Poverty and sizable for those in Near Poverty.

Table 2 provides further evidence that borrowing can explain part of the difference in income and expenditure in the bottom quintile of their distributions, again using CE data. The table splits the data into quintiles of the distribution of the difference between annual income and expenditure. The bottom quintile, with the largest excess of expenditure over income, has a median $14,048 difference, an implausibly large number which must require measurement error in income (or expenditure) for part of the explanation.[5] But the other columns of the table show the fraction of households in each quintile who have credit card debt, mortgages, vehicle loans, home equity loans, credit card balances, or other forms of debt, and the last column shows the fraction in each quintile with any loan. The percentages are, on average, inversely related to the size of the income-expenditure gap, and the correlation between the percent having any type of loan (last column) and the the median gap (first column) is -.84. This provides further evidence that part of the income-expenditure gap is explained by borrowing.

Durables. In the presence of durables, let S_t be the service flow off a durable at time t and let

[5]This result has been previously noted by Sabelhaus et al. (2015) (e.g. Figure 8.4). Hong et al. (2024) is the only paper of which we are aware which attempts to estimate the magnitude of measurement error in CE income using linked administrative data, and those authors find that their error-corrected income measure closes part of the gap between CE income and expenditure.

utility correspondingly be $U(C_t, S_t)$. A household maximizes lifetime utility and allocates resources across periods to achieve the desired level of S_t as well as C_t in each period. The flow equation is now

$$C_t + Q_t + L_t = Y_t + rA^f_{t-1} + (A^f_{t-1} - A^f_t) + (A^o_{t-1} - A^o_t) \tag{5}$$

where Q_t is new purchases of durables at t (downpayments or outright purchases) and L_t is the required payment on any loan. The left hand side is total expenditure allocated to the period.

There are two liquidity issues with durables. The first is that loan payments are contractually obligated and hence illiquid in that sense because they cannot be used to purchase any other good in the minimum bundle. The proper way to handle that illiquidity is to subtract them from resources:

$$C_t + Q_t = Y_t + rA^f_{t-1} + (A^f_{t-1} - A^f_t) + (A^o_{t-1} - A^o_t) - L_t \tag{6}$$

showing that expenditure on nondurables and new durable purchases equals resources allocated to the period minus any loan payment. The LHS is what we will term throughout our paper as "liquid resources" allocated to the period, defined as resources that can be used to purchase any consumption good the household wishes to buy and hence are not restricted to purchase of any specific good.[6]

The second liquidity issue depends on how the poverty threshold is defined. Assuming one defines the threshold as the expenditure needed for the consumption of a specific minimum, fixed bundle of necessities of life (often called "basic needs"), it can be written as

$$T = \sum_{i=1}^{i=N} P_i G_i \tag{7}$$

where T is the threshold, G_i is the minimum level of good i, P_i are the goods prices, and N is the

[6]We include both principal and interest in L. This treatment differs from the traditional user cost of capital concept, which treats only interest as a true economic cost. But in keeping with ignoring assets in resources, as we have emphasized most current poverty analyses do, we ignore the investment value of paying principal.

number of goods in the threshold. This is the formal definition of a minimum bundle threshold concept.[7] If the durable good is one of the goods in the minimum bundle, then its G equals a minimum service flow. But actual service flows off durables are illiquid and cannot be used to purchase any other G and hence cannot be included in liquid resources. Instead, they should be considered to be contributions toward meeting the minimum consumption of the good. With G_j denoting the minimum consumption of the durable good and S_j denoting the actual service flow, the threshold entry for the durable good should not be G_j but should be $Max(G_j - S_j, 0)$. Service flows below the minimum imply that liquid resources are needed to purchase more of the good if the minimum is to be attained, while service flows in excess of the minimum remove the good from the threshold; but excess flows do not alter the minimum required purchase of any other good from liquid resources because those flows cannot be used toward other goods.[8] [9]

We should note that this treatment of service flows as illiquid ignores the possibility that durables can in principle be used to generate liquidity. But, as we have emphasized, our poverty measure uses for resources only those actually used in the period, not potential resources, and if a household accesses liquidity from its durable in a period and uses it for expenditure, that will be included in our expenditure measure. However, our baseline model below treats only homes as illiquid, not other durables, and there is little evidence in the CE that low-income households sell or rent out their homes or make home equity loans. Never more than 3 percent of the sample in the lowest quintile of the expenditure distribution have home equity loans, and we do not observe

[7] Not all countries define the threshold in this way. In addition to the U.S., Canada uses a minimum bundle definition of the threshold (see Garner et al. (2023b) for a discussion and comparison to the U.S. concept). The U.S. tradition was most explicitly argued for by Citro and Michael (1995) ('the poverty standard is based on a level of family resources...deemed necessary to obtain a minimally adequate standard of living, defined appropriately for the United States today.').

[8] Nothing here suggests that households are not maximizing utility. They choose to have illiquid service flows, presumably because the durable in question appreciates and has a good rate of return. But the threshold concept used in the U.S. is not based on utility, but only on whether a household has sufficient resources to purchase a specific bundle of goods in a specific time period, which is a different concept. Alternative definitions of the threshold would lead to a different treatment of durables.

[9] This issue has a relationship to the hand-to-mouth model, where households tie up some of their assets in an illiquid form which has a high rate of return and leave themselves vulnerable to transitory shocks (Kaplan and Violante (2014)). But, while homeowning, which is the primary source of wealth-building for low income households, is similarly an illiquid investment that ties up wealth in that form, the issue here is that it may leave households unable to purchase the other goods in the threshold minimum bundle. This rationale does not require the presence of uncertainty in the model.

any families renting out homes. We cannot observe refinancing but we find little selling of homes in the data. The reason for the low incidence of these actions is the high transactions cost of home equity loans, refinancing, and home selling. Banks impose stringent payment-to-income ratios and loan-to-value restrictions that make it difficult for low-income homeowners to access liquidity in their homes. Boar et al. (2022) estimate that, because of these high costs, about 82 percent of all US homeowners are liquidity constrained in the sense that they would be willing to pay to extract liquidity from their homes but prohibitive costs prevent them from doing so. The percent is no doubt higher for low income homeowner households.

In-Kind Transfers. Government in-kind transfers, where the government provides a household with a free quantity of a particular good (or a subsidized amount in return for some contribution by the household), share the illiquidity feature of durables. In-kind transfers should not be included in liquid resources because they cannot be used to purchase any good in the minimum bundle other than that good for which they provide a subsidy. Instead, the threshold should again be adjusted for their contributions to the consumption of the particular minimum bundle at which they are aimed. If I is the value of the in-kind subsidy and G_I is the value of the good in the threshold, the capped quantity $Max(G_I - I, 0)$ should be considered to be the remaining, unmet need for the good in the threshold. If the transfer is for a good not in the threshold, it should be ignored and not included in resources available to purchase the threshold goods. We do not regard this as a major contribution of our study because the issue is widely understood in the literature (where it is often called the "fungibility" problem). But we list it to emphasize that it is motivated by the same illiquidity issue we have identified for durables. In addition, our treatment adjusts the level of the threshold instead of adding a (possibly capped) value of the in-kind benefit to resources, as much of the literature proposes. For example, the Census Bureau adds housing subsidies to the threshold but caps them at the level of housing needs in the threshold, which is equivalent to making a capped adjustment in the threshold for each household. But the Census Bureau does not conduct any capping for food subsidies, for reasons outlined in Fox and Burns (2020).

Transfers Counterfactuals. An important use of any poverty index is to assess the effects of government transfers on the rate of poverty. The standard approach in the literature is to remove transfers from income and to recalculate the rate. But our framing of poverty measurement in terms of life cycle models and their emphasis on the amount of expenditure allocated to a period as a matter of choice questions whether this is correct, for the life cycle model under uncertainty implies that households do precautionary saving in anticipation of unexpected negative shocks and also that transfers play an insurance role, replacing lost resources from negative shocks but not necessarily fully, especially if households have other forms of insurance in the absence of transfers. For our expenditure-based poverty measure, the implication is that, in the absence of transfers, (1) precautionary saving could increase, thereby lowering expenditure and raising poverty rates for those whose reduced expenditure moves them below the poverty threshold, and (2) expenditure for those who would otherwise receive transfers would fall, but not necessarily by the full amount of the transfer if they have other forms of insurance to partially offset negative shocks, thereby not raising the poverty rate as much as a no-insurance assumption would imply, thereby partly offsetting the rise in the poverty rate.[10]

The seminal paper in this literature is Hubbard et al. (1995) (HSZ). While there have been many developments in the literature since that paper, the basic elements of all models are similar. Households make consumption and savings decisions each period, maximizing current utility and expected future utility in the knowledge of future income or expenditure shocks of some kind. Negative income shocks make some households eligible for transfers, and receipt of benefits from those transfers partially or fully offsets those shocks.[11] An important conclusion of the HSZ findings (from a calibrated model) is that, if transfers are sufficiently large, low income households will do no precautionary saving and will have no liquid assets, which they argue is

[10]The role of transfers in a world of complete certainty is different. With perfect capital markets and no liquidity constraints, then, under standard assumptions, households who know future income in every period with certainty will smooth consumption if that income flow is uneven. In the presence of liquidity constraints, transfers could act to relieve those constraints in periods of low income.

[11]HSZ also argue that asset tests in transfer programs also discourage saving. However, since the time of that paper, asset tests in the three largest U.S. transfer programs–Medicaid, the Food Stamp program, and the Earned Income Tax Credit–have entirely or almost entirely disappeared.

approximately observed in the data. As we have noted above, liquid assets are not zero for the households with expenditures in the full range relevant to poverty measurement, but the implication of the HSZ analysis is that liquid assets are endogenous and would be even higher in the absence of transfers. Although rarely considered in the literature, the magnitudes of those effects should also depend on the size of potential credit card borrowing and informal sources of borrowing that we have added to the flow equation above.

For the measurement of the effects of transfers on poverty rates, what is needed are estimates of how expenditure differs in the presence of transfers and in their absence, and for households at different levels of expenditure, since both insurance and precautionary savings effects are likely to differ by that level (or, more commonly, by level of income). Unfortunately, the literature on the causal effects of transfers on precautionary saving (Hubbard et al. (1995),Engen and Gruber (2001),Gruber and Yelowitz (1999),Ziliak (2003),Lugilde et al. (2019)) and on partial insurance (Gruber (2000),Blundell and Pistaferri (2003),East and Simon (2024)) is not sufficiently developed to provide precise estimates of these effects.[12] One problem is that only a few transfer programs have been studied, far less than what is needed for a comprehensive estimate of the effects of the U.S. transfer system as a whole, which is our goal and the typical goal in the poverty measurement literature. Second, the precautionary savings literature typically estimates the impact of transfers on age-wealth profiles, which is not easily translated into the per-period expenditure impacts we need. Third, the studies rarely stratify the impacts by level of income or expenditure. It is probable that the conventional view that low income households not only do little saving but would do little in the absence of transfers, and further have no alternative sources of insurance implying they are fully insured by transfers, may be true of the poorest households but probably not for those somewhat higher in the distribution. The $30,000 and $45,000 thresholds noted above are are both high enough that it is likely that some households with expenditure just below those values would do some precautionary saving in the absence of

[12]We note that there is a large literature on whether households are insured against shocks in general, but not specifically studying the effects of transfers (Blundell et al. (2008)). We restrict our literature review to studies specifically of insurance from transfers.

transfers and would have at least some alternative sources of insurance. However, in the absence of precise estimates from the literature, the best that can be done at this point in the literature is to show the sensitivity of estimates of the impact of transfers on poverty to different assumed values for precautionary saving and insurance coverage, and this is what we do in our work reported below.[13]

II Data and Variable Construction

A Expenditure Poverty

We use the Consumer Expenditure Survey produced by the U.S. Bureau of Labor Statistics (BLS). The CE is a representative sample survey of the U.S. non-institutional civilian population and collects detailed information on household expenditures (which it generally calls "outlays") by quarter for four sequential quarters across a large number of categories (we use only what is called the "Interview" survey) for what they call "consumer units" (groups of people who jointly consume goods, which we will call households). We start with the 2009 survey because an improved measure of housing service flows began in that year (see below) and we use all surveys through 2022. Here we summarize the way we construct the threshold and resources, leaving many data details to Online Appendix A.

For the construction of the threshold for our expenditure poverty measure, we follow the general method adopted by the U.S. Census Bureau and some other countries by defining a specific set of goods considered to be necessities of life and then defining a minimum bundle (henceforth MB) of those necessities for the poverty threshold. For the sake of comparison with the Census Bureau, we choose the same necessities as they adopt: food, clothing, shelter, and utilities.[14] We calculate an expenditure amount for food, clothing, and utilities and a consumption

[13]There is also a very large literature in macroeconomics on the consumption response to stimulus transfers during recessions and, more generally, in response to income shocks of various types. See Crawley and Theloudis (2024) for a useful and comprehensive recent review. This literature does not focus on the low income population or on the types of transfers we consider, so we do not draw on it for our empirical exercise.

[14]We also follow the Census, for comparability, by adding a small amount of additional expenditure on other goods. See Online Appendix A.

amount for shelter (see below) for each consumer unit and, following the Census Bureau's current procedure, impute four government in-kind transfers that are not reported by CE respondents as part of their private expenditure–housing subsidies, two food subsidies, and utility subsidies (added, respectively, to private expenditure on shelter, food, and utilities).[15] Totals of the four goods are then summed.

Again following the Census Bureau, we examine the distribution of that sum across all households and select a percentile point of that distribution as the poverty threshold (i.e., the MB) and use it to construct thresholds (see below for the percentile point we choose). This type of threshold is generally termed a "relative" poverty measure because it is defined relative to the full national distribution of MB consumption and hence changes over time as national consumption of the MB goods changes, and will rise in real terms if real expenditure on the MB goods in the lower part of the distribution rises.[16] [17] But because the threshold is subjective and socially-defined, and hence is arbitrary in that sense (e.g., the percentile point chosen), we also calculate poverty rates using higher and lower thresholds.[18] As an additional comparison, we also compare our poverty measure to that using so-called absolute (as opposed to relative) thresholds that hold the threshold fixed in real dollars over time. The intended contributions of our analysis–using expenditure as resources, adjusting for illiquidity of durable flows and in-kind transfers, and using a correct counterfactual for the absence of transfers–do not depend on the particular threshold used and hence apply to any threshold, although the level of our poverty rate (and that of income measures) differs depending on what threshold is used.

Unlike the Census Bureau, we use an estimated service flow for homeowners instead of any

[15]The two food subsidies are the National School Lunch Program and the Women, Infants, and Children program. Again following the BLS and the Census, we assume that SNAP benefits are included in reported CE food expenditures by the respondents and hence are not added to CE expenditures. See https://www.bls.gov/pir/spmhome.htm.

[16]We make the same equivalence scale adjustment for family size and composition to the threshold as the Census Bureau, for comparability. We do not make geographic cost of living adjustments. See Online Appendix A.

[17]The Census Bureau uses a price index because it averages the previous five year's expenditure on the four necessities. We do a slightly modified averaging as described in Appendix A and we use for the averaging the Chained-CPI-U price index, which the U.S. BLS recommends as the best cost-of-living index of those they construct. However, the threshold for each year t is always in current year dollars, which is compared to resources, as defined below, in current year dollars as well.

[18]"...there is no purely scientific basis for specifying the level that should be defined as the threshold for poverty" (Citro and Michael (1995),p.37)

measure of housing expenditure (the Census Bureau uses an expenditure method described below). We calculate housing service flows using a CE question asking homeowner respondents in each quarterly interview how much their primary residence house would rent for, unfurnished and without utilities. The annualized estimate of the housing services flow is our measure of homeowners' housing consumption.[19] For the threshold estimate of shelter consumption we use this rental equivalence for the household's primary residence. For renters we use their rent paid as their housing consumption. With this approach, our threshold thereby becomes a consumption measure rather than an expenditure measure. To pick the percentile point of the MB distribution for our baseline analysis, we pick the 25th percentile in the first year of our data (2009) because this yields a threshold value close to the approximate 33rd percentile of the expenditure distribution used by the Census Bureau. As noted earlier, we will show our poverty measure results for higher and lower values of the threshold as well.[20] Also as noted earlier, we subtract capped housing flows from the threshold shelter amount to capture the reduction in housing need yielded by those flows (the housing consumption remaining in the threshold is therefore $Max(S-F,0)$, where F is the housing service flow and S is the shelter consumption amount in the MB). We likewise subtract capped in-kind transfers (housing subsidies, food subsidies, and utility subsidies) from the relevant threshold consumption good.

On the resource side, our conceptual framework requires a determination of a household's liquid resources, which we define as resources that can be used for the purchase of any good or service in the MB that is still needed for purchase after subtracting off any service flows and in-kind transfers that may have already gone toward satisfying some of those MB needs. Our liquid resource measure equals reported CE expenditure, excluding service flows and in-kind transfers, but also minus what we term housing "expenses", which are expenses contractually or

[19]This is the estimate of owners' equivalent rent employed by almost all users of the CE (Armstrong et al. (2022), Fisher et al. (2015),Meyer and Sullivan (2012). Beginning in 2009, the CE introduced an adjusted measure of owners' equivalent rent that accounts for joint ownership and for homeowners who do not reside in the properties they own. In our analysis, we utilize this adjusted rental equivalence variable. Most surveys do not have such a question and must impute rental equivalence with other methods.

[20]The lower percentile point for the consumption distribution reflects the fact that our entire MB consumption distribution is above the MB expenditure distribution because housing service flows exceed housing expenditures for most households (a reflection of the good rate of return on homeowning)

implicitly incurred by homeowners as a necessity of owning a home. This includes mortgage payments (principal and interest), homeowner insurance, property taxes, and home maintenance. The resources spent on these items cannot be used for any other good in the MB and hence are not liquid. We also subtract SNAP benefits from expenditure because they are included in food expenditure reported by CE respondents and we address their receipt on the threshold side, as just noted.[21]

We construct our expenditure measure as a 12 month total, aggregating a household's expenditure from four quarterly interviews. This makes our expenditure measure match the time frame used in the CE income question (see below). There is some attrition by the time of the fourth quarter, so we take the fourth quarter sample and use inverse probability weighting to adjust for attrition on the basis of observables. Because the four quarters of data sometimes span two calendar years, we adjust the thresholds for the two years in question to apply to the same four quarter period as the expenditure data.[22]

Descriptive Statistics. Tables 3 and 4 show descriptive statistics for the main variables in our sample. The mean consumption of the MB goods in a small range around the 25th percentile for the index family is $25,864 in 2009 and $29,284 in 2022 in real dollars, the first and last years of our data.[23] At that threshold, shelter consumption is the largest need in dollar terms and food consumption the second largest. When liquidity adjustments to the thresholds are made, thresholds fall to $17,108 in 2009 and $18,163 in 2022 because housing service flows and in-kind transfers reduce the need for some MB goods. The range from the 20th to the 80th percentile of the distribution is from $10,741 to $22,639 in 2009 and slightly more in 2022. These values constitute the amount of liquid resources (expenditure) a family needs to escape poverty by this definition. Mean total resources, including in-kind transfers and housing expenses are $55,123 in 2009 and $61,692 in 2022. After subtracting in-kind transfers and housing expenses, mean liquid

[21] Our measure is necessarily after-tax since taxes paid are not available for purchase of the goods in the MB. Our liquid expenditure measure excludes credit card payments and all interest paid. See Online Appendix A.

[22] Calendar year poverty rates are time weighted averages. See Online Appendix A for details.

[23] The index family has 2 adults and 2 children; the thresholds for other families are adjusted from that index value based on the equivalence scale adjustment noted earlier.

resources are $44,279 in 2009 and $50,687 in 2022. The 20th and 80th percentiles of the distribution in 2009 are $22,466 and $60,288, respectively, and somewhat higher in 2022. The 20th percentile of liquid resources is higher than the 20th percentile of liquidity-adjusted thresholds, suggesting that the poverty rate is likely to be less than 20 percent, although the covariance between the two will determine that rate. Mean housing flows and in-kind transfers are also shown; the former dominate the latter in magnitude.

More detail on the capping of housing flows and in-kind transfer is given in Table 4 for the last year of our data, 2022, and for the bottom quintile of the total expenditure distribution. Mean housing flows for homeowners are $13,320, which is larger that the shelter consumption amount in the threshold for 73 percent of families. The mean capped flow, which is the amount subtracted from the threshold is $7,111. These families represent 34 percent of the total sample, including renters. Mean housing subsidies for those who receive them are $8,938 and 60 percent of those recipients have subsidies greater than their threshold shelter values, leading to a mean capped amount of $5,923. But these recipients are only a small fraction of the population and only 8.5 percent of families overall have capped amounts. The food subsidy amounts for those who receive them are much smaller, $2,461 and only about 8 percent have amounts greater than the food amount in the MB, and the means for the total population are necessarily much smaller. Energy subsidies are small and almost never capped.

B Income Poverty

We compare our liquidity-adjusted L-SEPM measure to an income poverty measure constructed from CE income data. We term our constructed income poverty measure the Supplemental Income Poverty Measure (SIPM) in terminological analogy with the Census Bureau's SPM. We compute the measures on the same sample of CE households for which we compute expenditure poverty to make them fully comparable, a point emphasized by Fisher et al. (2015). A comparison of the two measures for the same households allows us to conduct an exact decomposition of the reasons for the differences between them, unlike using an income poverty

measure from the Current Population Survey (CPS), for example, which has a different sampling frame than the CE and different variable definitions for income and other key variables.[24]

We measure CE income based on questions about income received during the prior 12 months. This time frame matches our L-SEPM 12 month time frame. For the threshold, we follow the Census Bureau method, which also uses the CE for the construction of the threshold, and calculate the same sum of expenditure on food, clothing, shelter, and utilities for all U.S. consumer units, and likewise select the 33rd percentile of that distribution for the poverty threshold. And we follow the Census Bureau by defining housing need by estimating housing expenditure separately for homeowners with mortgages, homeowners without mortgages, and renters, and using a separate expenditure threshold for each of the three groups. Each group is regarded as having a different housing expenditure need–homeowners with mortgages have the greatest need for income, renters below that, and homeowners without mortgages need the least income (because they need to pay neither rent nor mortgage). This is a more indirect way of capturing needed liquid resources than that in our measure, which uses housing service flows for all homeowning households, regardless of a mortgage, instead of any housing expenditure value. The use of expenditure instead of housing service flows is likely to make a significant difference, for housing service flows do not equal housing expenditure. This difference may also affect trends over time, for the 25th percentile of the MB consumption distribution in 2009 in our measure may trend differently over time than using an equal expenditure value in 2009 because housing service flows and housing expenditures may trend differently over time, especially because housing markets tend to have cycles alongside long-run trends. Our deduction of capped housing service flows and in-kind transfers from the MB amounts will also lead to differences between our threshold and that used in the Census-Bureau-defined threshold.[25]

[24] In addition, to improve comparability of the income and expenditure distributions and focus on our main points, we do not make geographic cost of living adjustments, nor do we deduct medical out-of-pocket spending, work-related expenses, or child care expenses from resources, all of which are made by the Census Bureau for its income poverty measure. Online Appendix B compares CE income poverty and CPS income poverty, as well as discussion the impacts of these deductions made by the Census Bureau.

[25] However, adding the capped flows and in-kind transfers to income is equivalent to subtracting them from the threshold. Ziliak et al. (2023) recommended that the Census Bureau add capped housing flows to income.

On the resource side, we construct post-tax, post-transfer annual income by taking the responses of CE consumer units for post-transfer income and applying estimates of payroll taxes and federal and state income taxes to those values based on the NBER TAXSIM model. This measure of resources will differ from our liquid resource measure in part because our treatment of housing requires deducting housing expenses from resources. In addition, as already emphasized, income and expenditure will differ if households do any saving or borrowing. Also, because survey respondents are typically not asked to give their tax amounts because they would have difficulty reporting them accurately, post-tax income values are necessarily based on an assumed level of tax which may differ from what families actually pay. Our expenditure poverty measure does not require estimates of taxes paid.[26]

III Results

A The L-SEPM and Income Poverty

The L-SEPM poverty rate in the first year of our data, 2009–the fraction of all individuals in 2009 living in households with liquid resources below their liquidity-adjusted thresholds–is 9.0 percent. Figure 2 shows this rate in the first, red bar and shows how the poverty rate changes sequentially as each difference with income poverty is removed. The black bar shows the effect of no longer subtracting capped housing flows from the threshold and no longer subtracting housing expenses from resources. Because flows are, on average, greater than expenses, the poverty rises, to 10.7 percent. The grey bar shows the effect of no longer subtracting in-kind benefits from the threshold but instead adding up capped benefits to resources, but this has almost no effect because virtually all of those benefits are inframarginal. The green bar shows the effect of moving from our L-SEPM threshold, which selects the approximate 25th percentile of the MB distribution using housing service flows for the shelter need, to the Census threshold, which uses the 33rd percentile of an expenditure (not consumption) distribution with a differential adjustment for

[26] We compute calendar year SIPM estimates using the same averaging method that we used for L-SEPM: computing rolling 12 month income poverty measures and taking a weighted average to aggregate them to calendar years. Further data details are presented in Online Appendix A.

three housing types (see above). While our 25th percentile is set to be equal to the mean of the three expenditure thresholds, the variance in expenditure thresholds across the three housing types is quite large. The largest deviation from the mean is for homeowners without mortgages, who are assumed to need much less in expenditure than the other two housing types. The much lower threshold for this group dominates the change in the poverty rate, lowering it to 9.4 percent.

The final blue bar uses the same Census threshold definition as the green bar but just replaces total expenditures with income as the measure of resources, and hence represents the purest comparison between the two, uncomplicated by other differences. The poverty rate rises to 10.4 percent, 1.4 percentage point higher than our L-SEPM poverty rate. The reason for this result is shown in Figure 3, which shows the left tail of the expenditure and income distributions and shows the middle, black vertical line as the place where the average threshold is located (the other two vertical lines in the figure will be discussed momentarily). The higher income poverty rate is the simple result of the income distribution having a larger mass to the left of the line than for the distribution of expenditure.

Figure 4 shows trends in the L-SEPM poverty rate and the SIPM from 2009 to 2022, as well as again showing a decomposition of the difference between them into the same constituent parts shown in Figure 2. The red, L-SEPM line shows a slight jump in 2010 (the tail end of the Great Recession). It then remains stable over the 2011 to 2013 period before declining steadily through 2016. After 2016, it continues to decline through 2019 at a slightly lower rate. The poverty rate drops in the first Pandemic year, presumably because of the large increases in transfer payments that occurred in that year. The poverty rate rises in 2021 which could be the result of a reduction in some transfers and/or an increase in saving. The poverty rate then resumes its decline going into 2022, ending at a 4.7 percent rate.

The black dotted line shows the effect on our poverty rate of no longer subtracting capped housing flows from resources and no longer subtracting housing expenses from resources. This raises the poverty rate in all years by an average of 1.6 percentage points, with annual increases ranging from 0.8 to 2.9 percentage points, but the time trend retains its general shape. The grey

dashed line shows the effect of no longer subtracting capped in-kind transfers from the threshold and instead adding uncapped benefits to resources, having, as expected, very little effect, lowering the poverty rate very slightly. The dashed green line shows the effect of moving to the Census threshold, again lowering the poverty rate for the reason discussed previously, by an average of 1 percentage point, with annual impacts ranging from 0.8 to 3.2 percentage points. Again, the same general time trend is observed after this change.

The final, blue line shows the SIPM. That income poverty rate rises through 2013, declines at a slower rate than the L-SEPM through 2017, then declines more rapidly than the L-SEPM through 2019.[27] The SIPM declined in 2020 but more steeply than the L-SEPM, which is likely a result of many of the increased transfers in that year being saved rather than spent, and those saved transfers contribute to income poverty reduction but not expenditure poverty reduction. But the SIPM again declined in 2021, with the likely reason the continuation of transfers which were saved. In 2022, the SIPM rose because most of the Pandemic transfers ended, but expenditure poverty declined because families began to spend the savings from the prior two years.

Leaving the unique Pandemic period aside, the gap between the higher SIPM and the dashed green line grew over time and then declined. An examination of the distributions of expenditure and income over the time period shows that the relative difference in the L-SEPM trends and the SIPM trends from 2009 to 2019 stem from differences in the relative rates of growth of the two. Over the first half of the period the left tail of the expenditure distribution grew faster (or fell by less) than the left tail of the income distribution, whereas the opposite occurred in the second half of the period.[28]

Alternative thresholds. As noted previously, it is common to compute what are termed Deep Poverty rates using a threshold one-half of the baseline threshold as well as what are termed Near Poverty rates using a threshold one-and-a-half times the baseline threshold. Figure 5 shows that

[27] We have inquired of the U.S. Bureau of Labor Statistics whether there were some changes in the income questions in 2013 and they have informed us that there were changes in that year, as well as adopting a new method of estimating taxes paid.

[28] There was also a decline in the real threshold in some of the years in the first period. We should note that the trend for income poverty using the CPS has the same shape as that for the CE, falling slowly in the first half and falling more rapidly in the second half of the period. See Online Appendix B.

these alternative poverty rates dramatically change the relationship between our L-SEPM and the SIPM. Using the lower threshold to measure Deep Poverty makes the SIPM much greater than then the L-SEPM, more than two percentage points higher in most years. Near poverty rates show the reverse: now the SIPM rate is lower than the L-SEPM rate in all years but one, as high as 7 percentage points in some years. The reason for these changes lies in their differing distributions, as shown in Figure 3. The leftmost, green dotted vertical line shows the Deep poverty threshold, and it is clear that this widens the gap in the distributions of expenditure and income, with the left tail of the latter now much larger than that of the former. The rightmost, grey dotted vertical line denotes the higher Near poverty threshold, and it is apparent that, because there is a large mass of the expenditure distribution in that range (about $25,000 to $38,0000) more families are brought into poverty by having expenditure below the threshold than by having income below it. These results demonstrate that the level of the threshold is a key determinant of the relationship between expenditure and income poverty and, in general, the two will differ.

As we noted earlier, yet another alternative threshold concept often used is that which holds the threshold constant in real dollars, yielding what are termed absolute poverty rates. Calculation of absolute poverty rates necessarily requires selecting the threshold in a single base year and to hold the thresholds in other years constant to the real value in the base year. Figure 6 shows the result of this calculation using 2009 as the base year. Both measures decline more, on average, than in Figure 4, as a natural consequence of using a threshold held constant in real dollars rather than one which grows in real dollars over time. The faster rate of decline of the L-SEPM than the SIPM is again a simple consequence of their different left tail shapes of their distributions. As the real threshold falls and real expenditure and income grow, the different left-tail shapes imply that more expenditure values are moved over the threshold and out of poverty than income values, given the larger left tail of the income distribution.[29]

[29]We note that the use of a general price index is not appropriate if the low-expenditure population consumes a different bundle of goods than the general population (but the Bureau of Labor Statistics does compute a price index for lower income households). An additional issue is that, if the concept of a Minimum Bundle is taken seriously, as it is here, a price index is needed specifically for each of the goods in the bundle and which changes over time only because of changes in prices of each of the goods in the bundle. With the assistance of the Commissioner of the Bureau of Labor Statistics as well as staff member Bradley Akin, we were able to obtain separate price indices for

Demographics of the Expenditure Poor and the Income Poor. Table 5 shows the demographic features of those classified as poor by the L-SEPM and by the SIPM, along with differences in expenditure and income in the top rows. Expenditures of the L-SEPM poor are lower than those for the SIPM poor, and the income of the former is higher than that in the latter. This is a natural result of what variable is being used to screen out the non-poor, but it is a further demonstration that expenditures and income have quite different distributions (and that many of those deemed poor by conventional income measures have much larger expenditures than income).

The rest of the table describes demographic differences of the two poor groups. Most of the differences are not large in magnitude but one that is particularly large is the level of education, with the expenditure poor having much lower levels than the income poor. Inasmuch as education is strongly correlated with many indicators of economic need or lack thereof, this suggests that our expenditure measure is capturing more of the needy population. The expenditure poor are also more likely to be married than the income poor, and to have larger family sizes and more children; the latter two are likely the result of the first one. Both poverty measures use the same equivalency scale to adjust for differences in family composition and size, but it may be that those with more adults and more children far shorter of needed expenditure to buy the MB than those with fewer adults and children. The expenditure poor are more likely to be renters and less likely to be homeowners which again suggests that the expenditure poor have lower levels of economic resources because homeowning is positively correlated with those levels.

Transfers. As we noted in Section I above, the extant literature has shown that transfers have an impact on precautionary saving and that they provide partial consumption insurance. However, as also noted there, the literature is insufficiently developed to draw on directly for what is needed for our exercise, which is to determine a counterfactual defined as the level of liquid expenditure a household would have in the absence of transfers, and to differentiate the counterfactual by household income or expenditure level. Either calibrating a life cycle model to permit a

housing and non-housing goods and we computed absolute poverty rates applying different price indices for those two composite goods. We found little difference with Figure 6 because housing and non-housing prices evolved the same way, on average, over our period.

translation of existing work into our framework or estimating such a model ourselves is beyond the scope of our study and we leave that for future work.

In the absence of an adequate empirical basis for making such calculations, we fairly arbitrarily choose counterfactual expenditure impacts of current U.S. transfer programs to illustrate one set of possible impacts of these considerations on the rate of poverty. These estimates therefore demonstrate what the potential impacts of transfer programs on the poverty rate might be for one set of assumptions. We assume that the amount by which expenditure would be reduced in the absence of transfers because of increases in precautionary saving would vary by expenditure stratum in the population, and we stratify the population by the level of total expenditure and whether it falls into the Deep Poverty range, the Shallow Poverty range, the Near Poverty range, or the Above Poverty range (expenditure below 50 percent of the threshold, between 50 and 100 percent of the threshold, between 100 and 150 percent of the threshold, and above 150 percent, respectively). We ignore effects of transfer programs on expenditure for the purpose of defining these four groups of observations.[30]

For precautionary saving, we illustrate the potential effects by assuming that non-recipients would have liquid expenditure in the absence of transfers 5 percent less for the Shallow Poverty stratum and 10 percent less for the two higher strata. We assume that the poorest households would not do precautionary saving even in the absence of transfers. For households who are recipients of any major non-tax transfer program, we assume that, in the absence of transfers, liquid expenditure for those in the bottom group would be lower by the full amount of the transfers they receive, lower by 95 percent for those in the second lowest stratum, and lower by 90 percent of the transfer for the two higher groups. This ordering assumes that households have greater other sources of insurance, the higher their expenditure level. However, for tax credits (EITC and Child Tax Credit), which are received only annually and not monthly like non-tax transfers, we use lower figures based on the literature showing that EITC recipient households often use part of their tax credits received every Spring to make downpayments on durables and to

[30]The major transfer programs we examine are SNAP, TANF, subsidized housing, LIHEAP, SSI, and tax credits for the EITC and Child Tax Credit.

reduce unsecured debt (Barrow and McGranahan (2000),Gao et al. (2009),Shaefer et al. (2013),Jones and Michelmore (2018),Fisher and Rehkopf (2022)). For households receiving these transfers, we assume that liquid expenditure if they were withdrawn would be lower by 95 percent of the transfer for the bottom group, 90 percent for the second lowest stratum, and 85 percent for the higher two income groups.[31] [32]

The impact of this illustrative exercise on the anti-poverty effects of transfers in 2009 is shown in Figure 7. Simply removing all transfers and ignoring all impacts on expenditure, the current methodology in the literature, would raise the expenditure poverty rate from 9.0 to 16.4 percent, about a 7.4 percentage point (82 percent) increase. Making our precautionary saving and insurance adjustments would result in a poverty rate of 13.8 percent, about 4.8 percentage points (53 percent) higher instead, thereby moderating the increase in the rate. We emphasize again the purely illustrative nature of this exercise, and regard this effect as only illustrating the potential effects these adjustments might have. The figure also shows the separate impacts when only when only insurance impacts are accounted for–that is, when benefits are taken away from recipients but their expenditure falls by less than the full amount of the transfers–and when only precautionary savings effects are accounted for–that is, when the expenditure levels of non-recipients are lowered because of an increase in precautionary saving. The anti-poverty impacts of transfers come essentially entirely from the recipients; non-recipients do not lose benefits when transfers are eliminated and only a very small number of families would reduce their expenditure enough to fall below the poverty line.

Figure 8 shows trends from 2009 to 2022 in poverty rates when these effects are taken into account. The conventional methodology that removes all transfers from expenditure (red line to the green line) would show that transfers have had an anti-poverty impact that slightly grows over time, consistent with much work using income poverty measures showing the growing

[31] The impact of the adjustment for the highest expenditure stratum is effectively zero because almost no households in that group receive transfers. Our adjustments would be almost identical if that stratum were ignored.

[32] The MPCs implied by these hypotheticals are far above those in the macroeconomic literature on the consumption response to stimulus transfers. As noted previously, we do not draw on that literature because it is not focused on the low income population and does not consider the types of transfers we study.

importance of transfers over this period (and that poverty rates would have risen after 2016 in their absence and would have risen in the Pandemic period 2019-2021 in particular). However, after adjustment for precautionary saving and insurance effects (black line), the anti-poverty impact of transfers would not have changed over time, remaining at 4-to-5 percentage points in both years. While only illustrative, this does demonstrate the potential importance of the issue.

B Transportation

The poverty measure we have developed ignores vehicles, an important durable for the lower part of the expenditure distribution, where 73 percent of the bottom quintile own a vehicle. But to properly incorporate vehicles, we explicitly add a transportation need to the Minimum Bundle so that vehicles can be treated as contributing toward a minimum need. Adding such a need has been recommended by many of those suggesting improvements in the U.S. poverty measure (e.g. Renwick and Bergmann (1993),Citro and Michael (1995),Murphy et al. (2022),Ziliak et al. (2023)). We follow the same general principles as we have already followed, which is to add a measure of transportation consumption to the previous list of necessities–food, clothing, shelter, and utilities–and we pick the 25th percentile of that distribution in the population as the poverty threshold.

To calculate a value of transportation consumption to include in the MB for the threshold calculation, we follow a procedure similar to that for homeowners by calculating a service flow for vehicles for those who own vehicles. To estimate the flow of services from vehicles, we develop an estimate of the annual depreciation of the vehicle(s) for owners.[33] And for all households, including vehicle owners, we include transportation expenditures for public transportation, gasoline, maintenance, and vehicle rentals. But we wish to exclude work-related transportation from the value of transportation consumption for eavh household because that is a work expense and does not constitute direct consumption. There appear to be no reliable

[33]We follow the method of Meyer and Sullivan (2012). Estimating depreciation involves estimating the market price of each vehicle owned in each year based on purchase price and age, and then multiplying by an annual depreciation rate. See Online Appendix A for details. What we term the "service flow" from vehicles is annual depreciation plus operating expenses.

estimates of what fraction of transportation expenditures in the population is work-related and what fraction is non-work-related, so we rely on the informal estimate of one-half suggested by Citro and Michael (1995).[34] For the threshold calculation we also follow previous procedures of adjusting for family composition and size.

In addition, we follow our previous liquidity adjustment by subtracting (one half of) transportation service flows for vehicle owners from the threshold transportation need, again treating that flow as illiquid and unavailable for the purchase of other goods but treating as reducing transportation need. We again cap the amount subtracted by the MB threshold amount for transportation. Finally, for vehicle owners, we reduce liquid resources by subtracting the costs of owning and maintaining a vehicle, similar to our subtraction of necessary housing expenses for homeowners. These expenses include any loan payments, insurance, and maintenance.

Figure 9 shows the impact of adding transportation to our liquidity-adjusted, L-SEPM poverty rate in 2009, with the left-most red bar showing our previous, baseline poverty rate, 9.0 percent, and the right-most, green bar showing the poverty rate with transportation, which is about two percentage points higher, at 11.1 percent. The bars in between decompose the difference into their constituent parts. The poverty rate would rise to 10.8 percent if transportation were first just added to the threshold, without making any other adjustments. Of course, increasing the threshold without changing resources necessarily increases the poverty rate, so the only item of interest is how much; our method shows that adding transportation to the threshold in the way we have done would raise the poverty rate by almost two percentage points. The black bar shows the effect of deducting capped vehicle services from the transportation need, reducing the poverty rate to 9.4 percent; and then subtracting vehicle expenses from resources, shown by the green bar, raises it to the final 11.1 percent. In 2009, the impact of vehicle service flows was therefore slightly lower than that of vehicle expenses, but the difference is small and the poverty rate when adjusting for both, 11.1 percent, is very close to the 10.8 percent when adjusting for

[34] In addition, because non-work transportation was implicitly part of the small addition to basic needs which Census adds to the MB and which we added above, we reduce that addition to avoid double counting. See Online Appendix A for details.

neither.[35] The major reason for the higher poverty rate when incorporating transportation is, therefore, simply the increase in the threshold coming from adding a transportation need to it and continuing to use the 25th percentile; a lower percentile point would lead to a lower poverty rate.

Figure 10 shows the trends in the L-SEPM poverty rate after adding, sequentially, each of the same three adjustments made after adding vehicles to the calculation–first the addition of transportation to the MB, raising the threshold; then the subtraction of capped vehicle service flows from the threshold; and then deducting illiquid vehicle owner expenses from resources (all starting from our L-SEPM without transportation, the red line in the figure). While there are are some fluctuations in the poverty-rate impact of each of the three adjustments over time, just as in Figure 9, vehicle service flows and vehicle expenses almost cancel out, leaving the poverty rate about the same with or without them. The higher poverty rate when incorporating transportation (green line) is about 2 percentage points higher, on average, than our baseline poverty rate, and almost entirely coming simply from using a higher threshold.

We should note, as we did for homeowners, that vehicle owners can extract liquidity from their vehicles either by borrowing against their equity in them or selling the vehicles.[36] But, as we noted for the housing case, any equity actually extracted and used for expenditure is already reflected in our expenditure variable. Purely for illustration, Figure A-1 shows the effect on the poverty rate if vehicle owners were to sell their vehicles at our estimated market price. This is an overestimate of the true effect because the balance on vehicle loans is ignored (because it is not obtained in the CE for all vehicles), but the poverty rate would drop by several percentage points. However, this is unlikely to be an optimal choice if the future consequences of not having a vehicle were considered unless the household suffers a very large negative shock.

[35] Uncapped vehicle flows are greater than vehicles for the large majority of owners.

[36] Selling vehicles outright is rare. Only four percent of vehicle owners in the bottom quintile of the expenditure distribution sell any vehicles outright during the four quarters. The median value of equity gained by those who actually sold vehicles is 920 dollars.

C The L-SEPM and Consumption Poverty

Consumption poverty is a different concept than resource-based measures like expenditure or income measures. Consumption poverty is often regarded as a measure of permanent income and therefore a proxy for lifetime resources, but for low income households who have variable incomes and face liquidity constraints, current consumption will partly reflect per-period resources and not lifetime resources (even higher income households show excess sensitivity of consumption to income shocks). And for low income households with variable income who do not face liquidity constraints, current consumption will be partly determined by whether a household chooses to bring resources into the present or not, determined by its intertemporal substitution elasticity, and variation across households in that decision will reflect preference heterogeneity rather than resource variation. Consumption is consequently best considered to be simply a measure of current material well-being and not a resource measure.

We construct a consumption poverty measure from the CE and denote it as the Supplemental Consumption Poverty Measure, or SCPM, in line with our terminology for the expenditure and income poverty measures. We generally follow methods used in past work on consumption poverty (Meyer and Sullivan (2012), Armstrong et al. (2022), Han et al. (2022),Garner et al. (2023a),Hong et al. (2024)).[37] We calculate consumption in each year as the sum of nondurable expenditure and full, uncapped housing service flows for homeowners (and housing expenditure for renters), but excluding expenditures on goods regarded as directed toward saving or investment, as identified in past work–education expenses, personal insurance, cash contributions to retirement plans, and child daycare (which resource-based measures treat, instead, as available to purchase the MB). Full in-kind transfer benefits are also included in consumption.[38] Two differences in our consumption measure and that in much past work are that we include vehicle expenditure in resources instead of vehicle service flows and we do not deduct

[37]Fisher et al. (2015) also used the CE to construct consumption inequality measures and computed but did not publish a consumption poverty measure.

[38]Most consumption measures subtracting housing expenses from consumption, just as we subtract them from expenditures to arrive at liquid resources.

medical out-of-pocket spending or work-related expenses from consumption. The former is for comparability with our baseline L-SEPM measure, which only accounts for the service flow from homes and not vehicles (we argued above that adding vehicles to poverty measurement requires the addition of a transportation need to the threshold) and the latter is only examined in the Appendix for reasons denoted earlier.

On the threshold side, we begin with the same 25th percentile of the MB consumption distribution (which uses housing flows for shelter) as we have used for our baseline L-SEPM calculations. But the papers in the consumption poverty literature have generally not used this type of relative threshold concept based on an MB that Citro and Michael (1995) proposed and which the Census Bureau has adopted for its SIPM, and which we use in modified form, instead generally using absolute poverty thresholds or pure relative thresholds (e.g., percent of the median, used by many other countries). We shall first show levels and trends in our constructed SCPM using our MB-based threshold and then show results using absolute poverty thresholds.

Figure 11 shows the level and trend of the SCPM (black) and our L-SEPM (red) over the 2009-2022 period. The SCPM yields poverty rates higher than those of the L-SEPM in most years, starting off 1.4 points higher in 2009 and ending up a little less than a half percentage point higher in 2022. The other lines in the figure decompose the difference in the rates into three components. The dotted green line shows the effect of no longer subtracting capped housing flows from the threshold and, instead, adding uncapped housing flows to resources. This lowers the poverty rate, as expected, but has little effect on the trend. The dotted blue line shows the effect of no longer subtracting capped in-kind transfers from the threshold but instead adding those uncapped transfers to resources, lowering the poverty rate a small amount more but again having no effect on the trend. Finally, saving and investment expenditures are subtracted from resources to arrive at consumption, moving from the dotted blue line to the black line. This raises the poverty rate more than the first two factors reduce it, leaving the SCPM higher than the L-SEPM. The gap between these last two lines declines slightly over time, signifying a reduction in the fraction of families moved above the poverty line when these expenditures are no longer

included in resources-consumption.

Figure 12 shows the two poverty measures when absolute thresholds are used and when the real threshold is held constant at its 2009 level. There are small differences in the rates of decline of the two in the first period but similar rates of decline in the second period, leaving the two rates at almost the same point in the last year. This implies that the distributions of consumption and expenditure in the neighborhood of the downward-moving real threshold are similar.

IV Summary and Recommendations for Future Research

The rate of poverty in a country can be conceptualized and calculated in a number of different ways, each with different strengths and weaknesses. Income-based poverty measures are the most common, and are particularly useful if there is little or no borrowing and only low levels of liquid assets in the low income population, in which case income is essentially equivalent to expenditure. Income data are also more widely available than expenditure data. But income-based measures miss the availability of any borrowing or any use of liquid assets and have difficulty dealing with durables and in-kind transfers, which are not as liquid as pure cash income and therefore not an equivalent resource, and this is particularly true if the definition of basic needs used to construct the poverty threshold is a bundle of specific consumption goods whose purchase is easiest with liquid resources. Income-based measures are not easily modified to account for the effects of government transfers on expenditure because expenditure is not part of the framework.

Consumption poverty measures are at best a measure of material well-being and are conceptually different than measures of resource poverty. The exclusion of expenditures on saving and investment from consumption is the best example of the difference, for those expenditures constitute resources which could be spent instead on purchasing the goods in the basic needs bundle. The presence of durables and in-kind transfers may or may not present difficulties for consumption poverty measures depending on how the threshold is defined. If the threshold is defined as some level of total consumption deemed to be required to not be poor, utility-maximizing choices of durables and receipt of in-kind transfers do not present difficulties,

but if the threshold is defined in terms of the consumption of a bundle of specific goods, the illiquidity of durables and in-kind transfers could be argued to require some kind of adjustment.

Our new measure of poverty, based on liquid expenditure, has comparative strengths over income and consumption but also has weaknesses. Expenditure is a clean theoretical concept of the amount of resources transferred into a period of the life cycle when those transfers are possible through borrowing or liquid asset drawdowns, as we argue they are for a significant fraction of the disadvantaged population. Focusing on liquid expenditure also permits a clean treatment of durables and in-kind transfers and their illiquidity by allowing an adjustment to be made to the poverty threshold instead of to resources when the basic needs in the threshold are defined as a specific set of goods consumption. A focus on expenditure also provides a framework suitable for examining the effects of government transfers on poverty by considering how expenditure is affected by transfers. A final advantage of our expenditure measure relative to income measures is that expenditure in the CE appears to be more accurately measured than income. Alongside these strengths, however, our measure has limitations. The most important is that it is a measure of actual resources used in a period, not potential resources. But estimating potential resources is challenging because it not only includes current income and current assets, but should also include potential borrowing and even should include past labor income that could have been saved and brought into the present. In addition, the assumption in our poverty measure that durables and in-kind transfers are completely illiquid is also only an approximation to reality and would be less plausible, the longer the time period over which resources is measured. We reserve work on both of these limitations for future research.

An additional area where more research is needed is more work on the insurance effect of transfers and the effect of transfers on precautionary saving on expenditure and consumption. The current literature is inadequate to even approximate how those forces affect the anti-poverty effect of transfers, allowing only speculative exercises to be conducted at the present time. Our empirical illustration, while indeed speculative, does illustrate the potential for these channels to have an impact on the anti-poverty effect of transfers. This is one of the most important questions

for public policy on redistribution.

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Table 1: Liquid Assets and Credit Card (CC) Balance

	Under age 65		Age 65 or older	
Expenditure	Liquid assets	CC balance	Liquid assets	CC balance
0–50% Threshold (Deep Poverty)				
Mean	$808	$326	$6,939	$172
p50	$0	$0	$0	$0
p75	$0	$0	$14	$0
p90	$955	$0	$1,027	$0
50–100% Threshold (Shallow Poverty)				
Mean	$1,233	$332	$5,162	$349
p50	$0	$0	$0	$0
p75	$93	$0	$574	$0
p90	$1,419	$283	$5,648	$287
100–150% Threshold (Near Poverty)				
Mean	$3,232	$959	$12,619	$722
p50	$0	$0	$19	$0
p75	$892	$0	$2,389	$0
p90	$4,596	$2,143	$21,444	$1,263
150% Threshold or Above				
Mean	$19,342	$2,652	$37,727	$1,531
p50	$1,516	$0	$2,731	$0
p75	$10,269	$2,035	$23,123	$335
p90	$41,418	$8,027	$118,219	$4,000
Sample size	61,060	66,854	19,806	22,943

Source: Consumer Expenditure Survey (2009–2022).
Note: All dollar values are expressed in 2014 dollars and adjusted using the C-CPI-U.

Table 2: Loan Participation Across Y–E Differential Quintiles for the Bottom Quintile of Total Expenditure and Income

Quintile	Y–E Median	Credit Card	Mortgage	Vehicle	Home Equity	Other	Any Loans
1	$-14,048	13.8%	12.7%	13.4%	1.2%	10.2%	38.9%
2	$-6,678	15.7%	10.0%	12.0%	1.2%	10.5%	36.5%
3	$-2,140	16.1%	9.9%	11.3%	1.2%	11.1%	38.2%
4	$1,273	15.5%	8.3%	10.9%	1.2%	9.7%	34.1%
5	$5,734	13.3%	5.8%	7.6%	0.8%	8.7%	28.9%
Correlation (Y–E & Any loan): -0.84							

Source: Consumer Expenditure Survey (2013–2022).
Note: The sample includes households in the bottom quintile of both total expenditure and income. Values represent the share of households with a positive balance in each loan category. All dollar amounts are expressed in 2014 dollars and adjusted using the C-CPI-U.

Table 3: Thresholds and Resources, 2009 and 2022

Year	2009	2022
Thresholds (2A2C)	$25,864	$29,284
Food	$7,067	$7,845
Clothing	$886	$783
Shelter	$9,650	$11,825
Utility	$3,903	$3,867
Little More	$4,357	$4,963
Liquidity-adjusted thresholds	$17,108	$18,163
p20	$10,741	$11,425
p40	$14,787	$15,293
p60	$17,495	$18,611
p80	$22,639	$24,237
Total resources	$55,123	$61,692
Less non-SNAP inkinds (CE expenditure)	$54,629	$61,045
Less SNAP and housing expenses (Liquid resources)	$44,279	$50,687
p20	$22,466	$26,555
p40	$31,908	$37,511
p60	$43,172	$48,645
p80	$60,288	$68,582
Housing Flows	$12,350	$15,195
In-kind Transfers	$725	$1,009
Sample size	4,975	2,960

Source: Consumer Expenditure Survey.

Note: Thresholds (2A2C) represent the average threshold values for families with two adults and two children. Food, Clothing, Shelter, Utility, and Little More represent the individual components of the minimum consumption bundle (the Little More is the small additional amount noted in the text). Liquidity-adjusted thresholds are thresholds reduced by the capped housing flows and in-kind transfers. Total resources include total expenditures from the CE and four in-kind transfers: NSLP, WIC, LIHEAP, and housing subsidies. SNAP is already included in the total expenditure reported in the CE. Housing flows are rental equivalence for homeowners and are set to 0 for renters. In-kind Transfers are set to 0 for non-recipients. All dollar values are expressed in 2014 dollars.

Table 4: Liquidity Adjustments to the Thresholds: Bottom Quintile of Total Expenditure, 2022

	Non-zeros only	Including zeros
Housing flows	\$13,320	\$6,208
% Housing flows > S	73.1%	34.1%
Capped housing flows	\$7,111	\$3,314
Housing subsidy	\$8,938	\$1,263
% Housing subsidy > S	60.1%	8.5%
Capped housing subsidy	\$5,923	\$837
Food subsidy	\$2,461	\$1,177
% Food subsidy > F	7.9%	3.8%
Capped food subsidy	\$2,356	\$1,126
Energy subsidy	\$146	\$23
% Energy subsidy > U	0%	0%
Capped energy subsidy	\$146	\$23
Sample Size	827	

Note: This table presents the average uncapped and capped housing flows and in-kind subsidies for households in the bottom quintile of total expenditure. All dollar values are expressed in 2014 dollars.

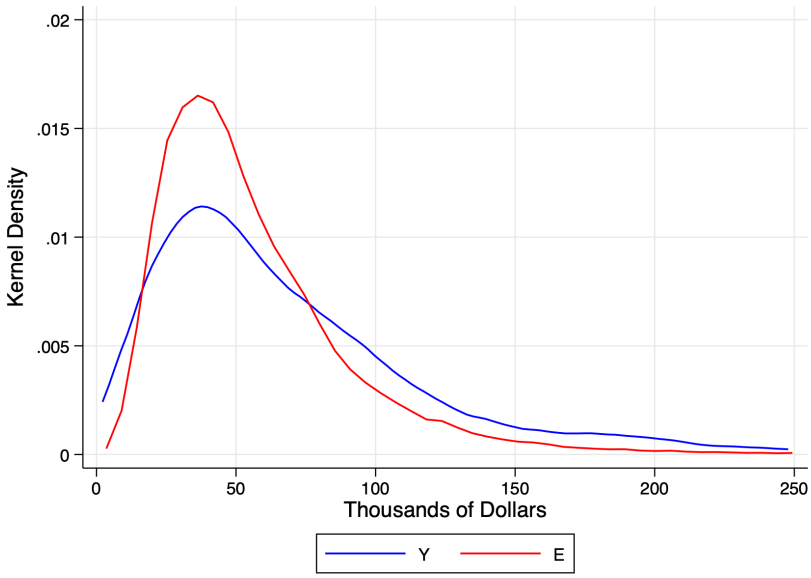
Table 5: Summary Statistics for L-SEPM and SIPM Poor Households

	L-SEPM Poor	SIPM Poor
Total Expenditure	$23,151	$32,091
Liquid Expenditure	$18,183	$26,382
Total Income	$33,486	$14,560
In-Kind Benefits	$1,412	$1,194
Reference Person Characteristics		
Education		
Less Than High School	0.41	0.29
High School Graduate	0.46	0.50
Some College or More	0.12	0.21
Age	44.62	47.42
Elderly	0.12	0.16
Race		
White	0.70	0.72
Black	0.22	0.22
Native American	0.01	0.01
Asian	0.05	0.04
Other Race	0.02	0.01
Household Characteristics		
Family Size	4.35	3.42
Number of Children	1.69	1.26
Married	0.46	0.38
Number of Vehicles	1.11	1.29
Number of Rooms	5.23	5.34
Housing Type		
Homeowner with Mortgage	0.15	0.21
Homeowner without Mortgage	0.18	0.20
Renter	0.66	0.59
Sample Size	2,617	4,831

Source: Consumer Expenditure Survey (2009–2022).

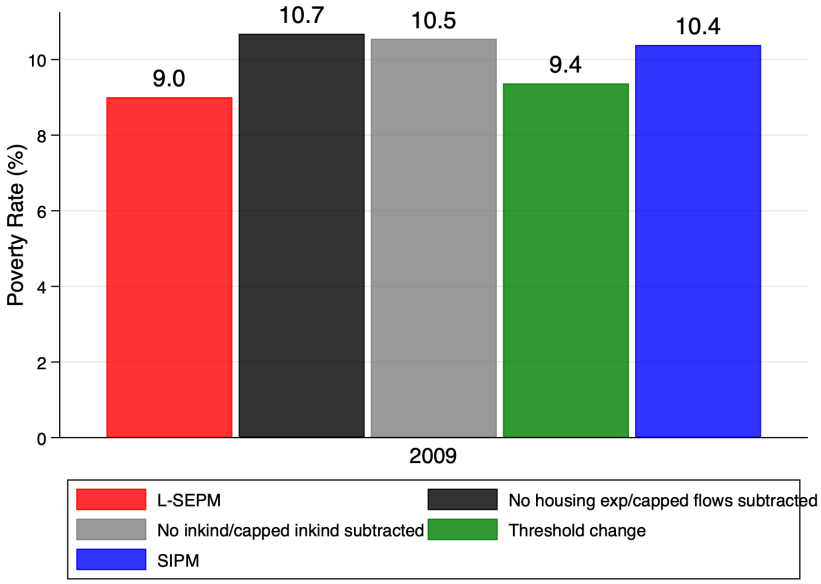
Notes: Table reports weighted mean household characteristics for L-SEPM and SIPM poor households. All dollar values are expressed in 2014 U.S. dollars.

Figure 1: Distribution of CE Expenditure and Income



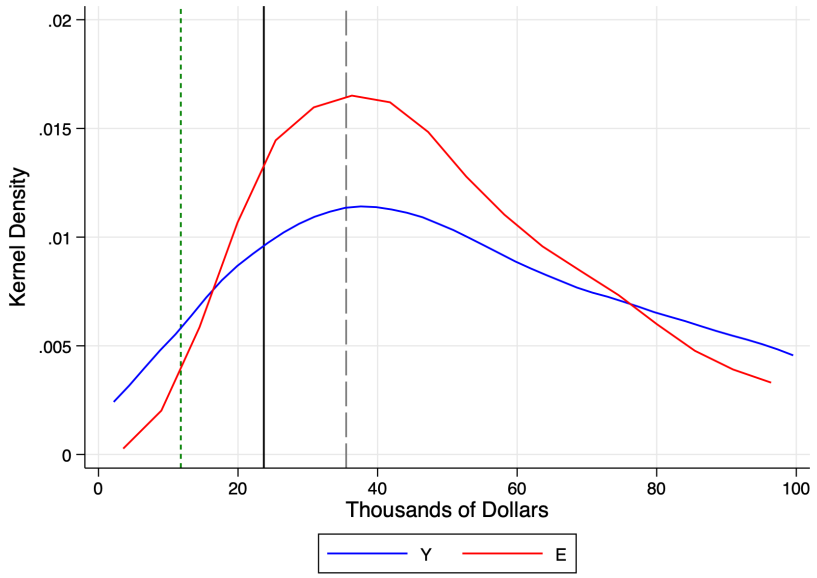
Source: Consumer Expenditure Survey (2009–2022).

Figure 2: L-SEPM Poverty Rates, 2009



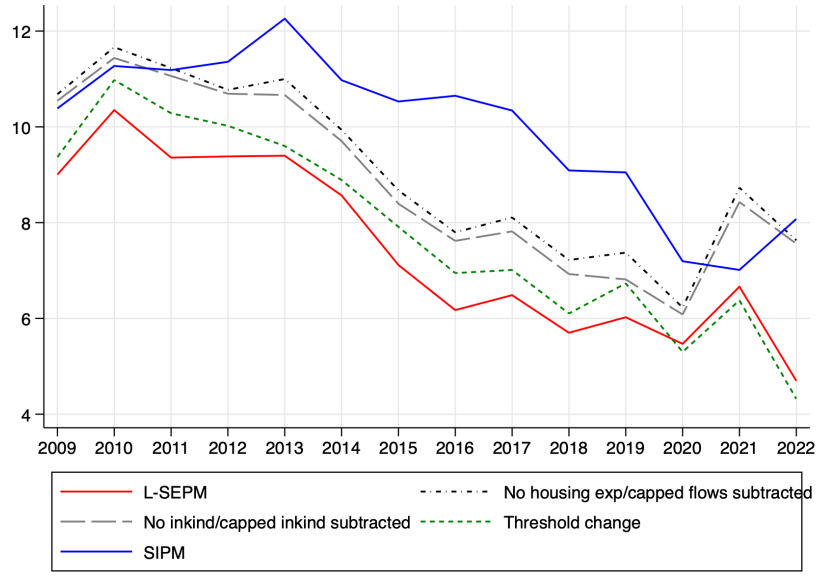
Note: The graph illustrates the 2009 level of the L-SEPM and its transition toward the SIPM. The black bar represents the effect of not adjusting thresholds and resources for housing flows, whereas the gray bar shows the impact of omitting adjustments for in-kind subsidies. The green bar shows the impact of shifting to the SPM thresholds. Finally, shifting the resource measure from expenditure to income produces the blue bar (SIPM).

Figure 3: Distribution of CE Expenditure and Income with Thresholds



Source: Consumer Expenditure Survey (2009–2022).
Note: The three vertical lines denote the averages for the deep poverty threshold, the SPM threshold, and the near-poverty threshold, defined as 50%, 100%, and 150% of the SPM threshold, respectively.

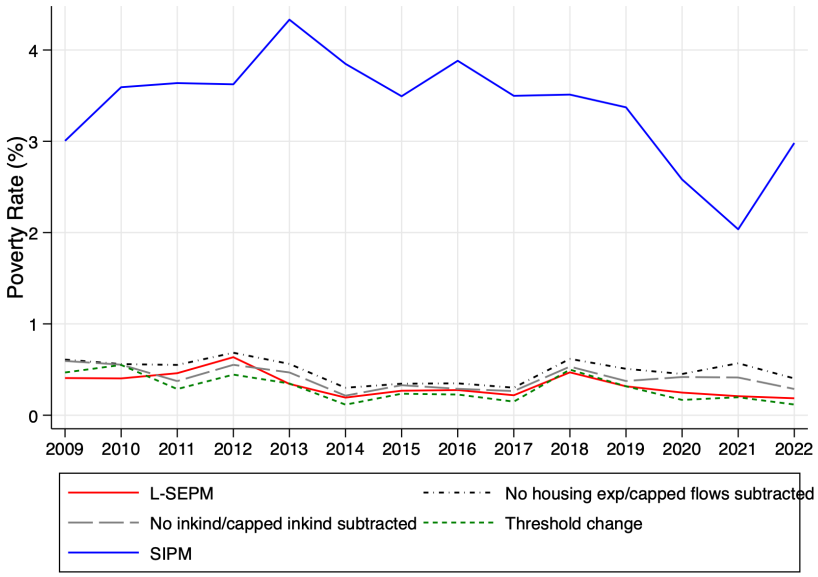
Figure 4: L-SEPM and SIPM



Note: The graph illustrates the 2009 level of the L-SEPM and its transition toward the SIPM. The dotted black line represents the effect of not adjusting thresholds and resources for housing flows, whereas the dashed gray line shows the impact of omitting adjustments for in-kind subsidies. The dotted green line shows the impact of shifting to the SPM thresholds. Finally, shifting the resource measure from expenditure to income produces the blue line (SIPM).

Figure 5: Deep and Near Poverty Rates

(a) Deep Poverty Rates



(b) Near Poverty Rates

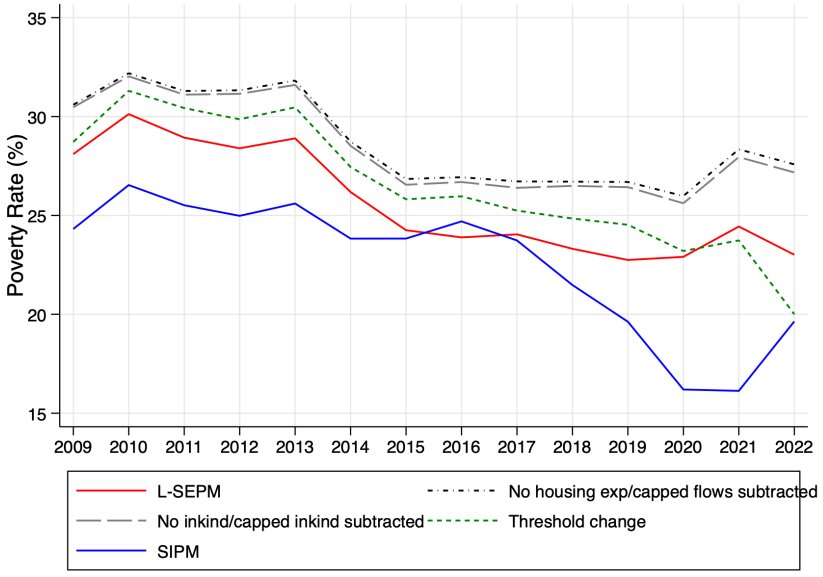
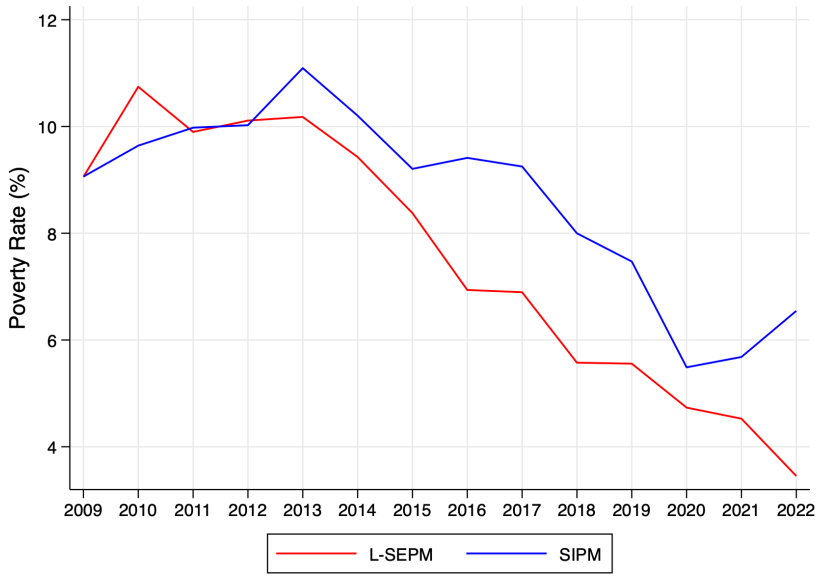
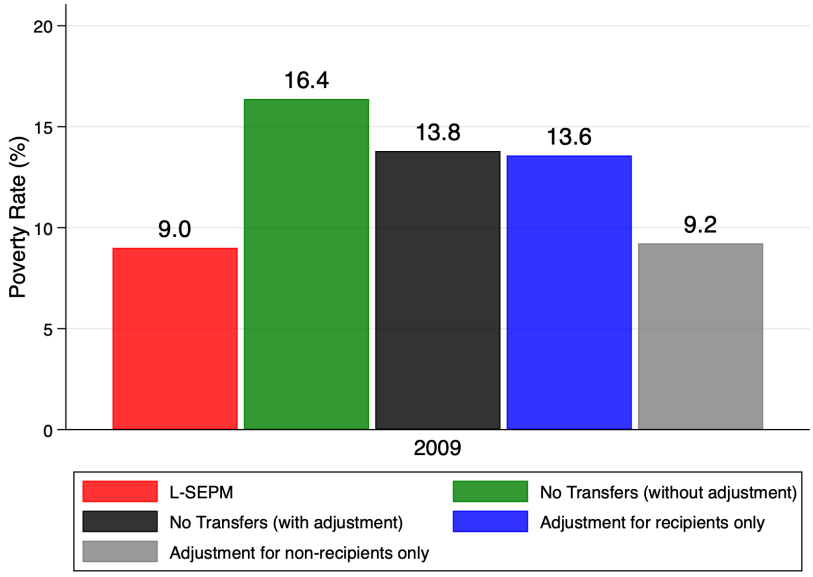


Figure 6: Absolute Poverty Rates, L-SEPM and SIPM



Note: Thresholds are anchored to the 2009 L-SEPM and adjusted over time using the C-CPI-U.

Figure 7: Effect of Transfers, 2009



Note: Samples were divided into four groups based on post-transfer resources: Deep, Shallow, Near, and Above Near Poverty range. For transfer recipients, EITC and CTC amounts were reduced by 95% for Deep Poverty, 90% for Shallow Poverty, and 85% for the two highest income groups. Other transfers were reduced by 100%, 95%, and 90% for these same groups. For non-recipients, total liquid expenditure was reduced by 5% for Shallow Poverty and 10% for the Near and Above Near Poverty range.

Figure 8: Effect of Transfers, 2009–2022

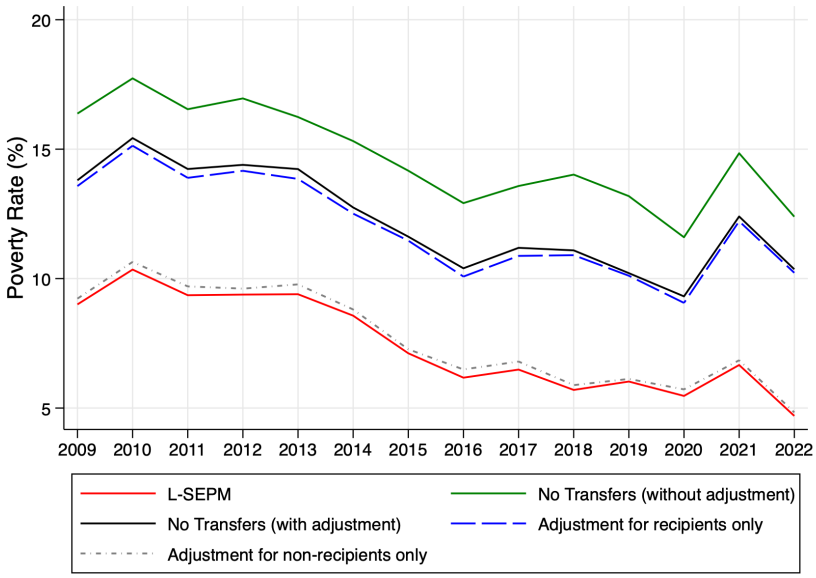
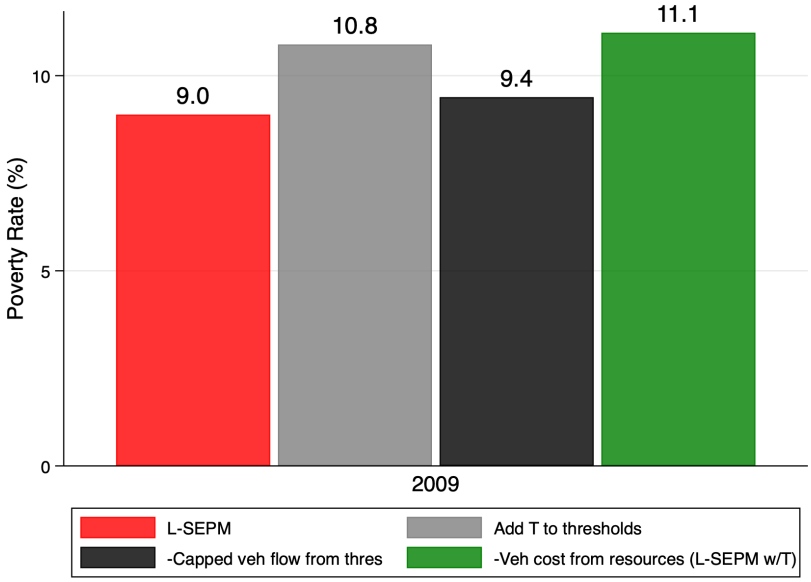


Figure 9: L-SEPM Poverty Rates Including Transportation, 2009



Note: The gray bar represents the effect of adding transportation costs to the minimum resource bundle. The black bar illustrates the threshold adjustment made by subtracting capped vehicle flows. In 2009, 70% of vehicle owners had vehicle service flows that exceeded the transportation portion of the thresholds. The green bar reflects the result of subtracting vehicle costs from resources, which constitutes the L-SEPM including transportation.

Figure 10: L-SEPM Poverty Rates Including Transportation, 2009–2022

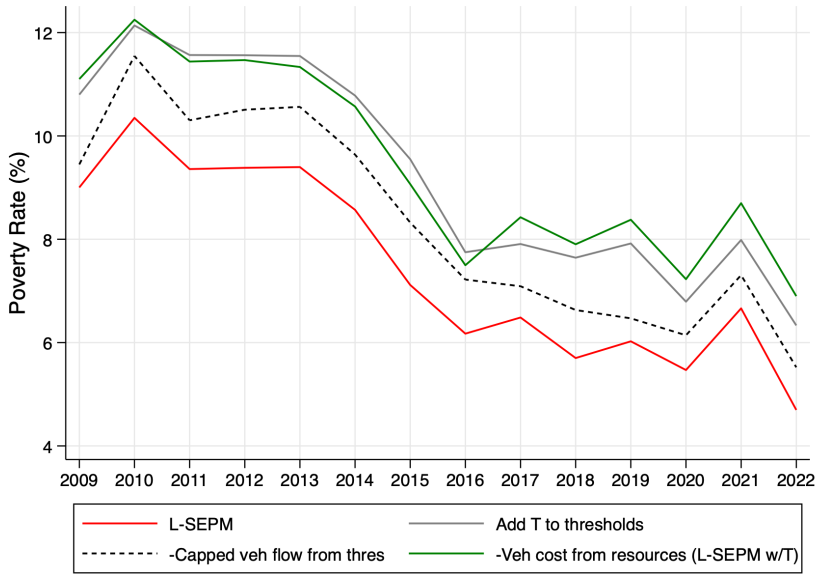
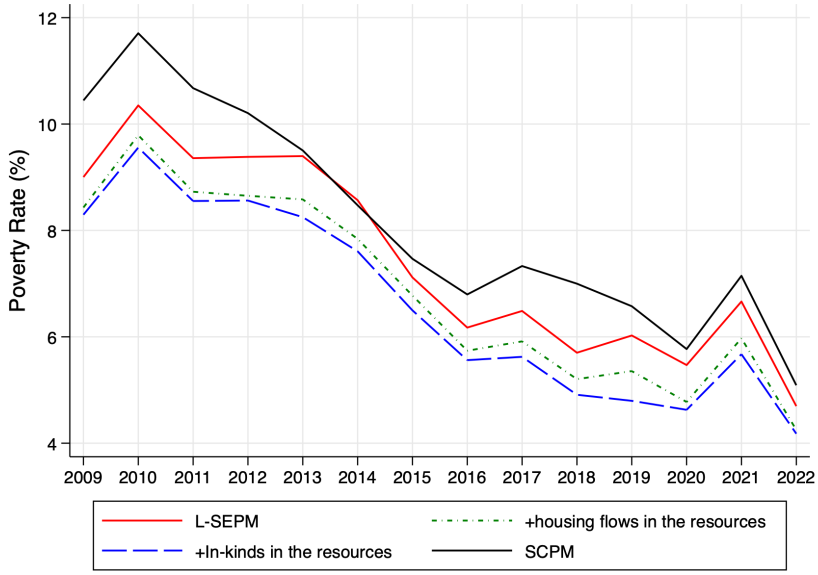
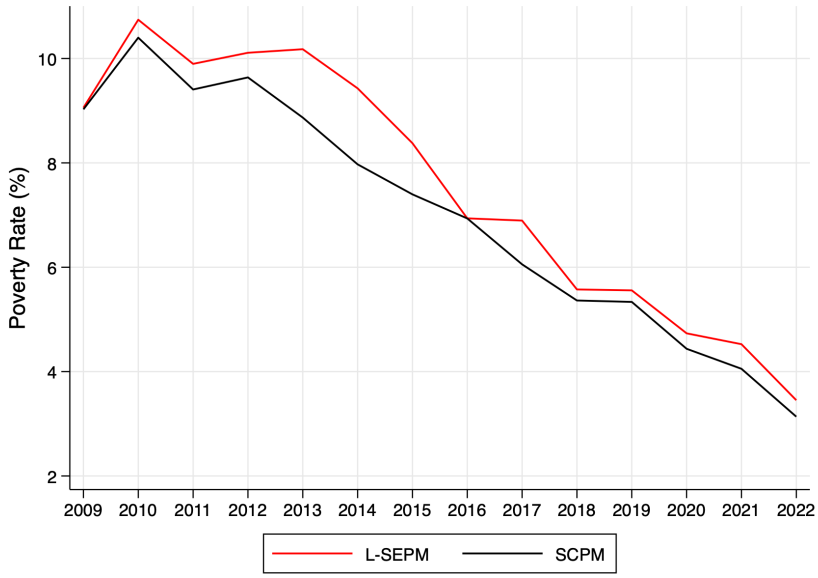


Figure 11: L-SEPM and SCPM



Note: The dotted green line illustrates the impact of no longer subtracting capped housing flows from the threshold and instead adding uncapped housing flows to resources. Similarly, the dotted blue line reflects the effect of not subtracting capped in-kind subsidies from the threshold and adding uncapped subsidies to resources. Finally, the transition from the dotted blue line to the solid black line (SCPM) captures the effect of no longer subtracting investment spending.

Figure 12: Absolute Poverty Rates, L-SEPM and SCPM



Note: Thresholds are anchored to the 2009 L-SEPM and adjusted over time using the C-CPI-U.

Online Appendix A: Data Construction

This paper uses many of the data concepts in Fitzgerald and Moffitt (2022) and more details can be found in the online data appendix to that paper.

I. Sample

a. Our sample units are CE consumer units. These essentially are households sharing resources. See the BLS definition at https://www.bls.gov/cex/csxgloss.htm, cited 1-27-22.

b. Time Frame and Weights. We measure expenditure and income over the same 12 month period. Because CE interviews collect data on expenditures for the prior 3 months, we arrive at a 12 month total by aggregating expenditures over four interviews. In the 4th interview, households are asked about income during the prior twelve months and this aligns with our expenditure measure. We recognize that the subsample with four complete interviews is subject to attrition that may select more stable households. To account for this, we multiply the initial sample weights by an attrition factor. This factor is the inverse of the probability of surviving to the 4th interview from the first interview estimated from the full sample of all households with one or more interviews. Covariates include household characteristics (age, education, renter status, income, expenditure) and time fixed effects. The initial sample weights are the final consumer unit weights provided by BLS. For statistics such as poverty rates by persons, we adjust the consumer unit weight by multiplying by the number of persons in the unit.

c. Calendar Year Dating. CE collects quarterly data on a rolling basis throughout the year with some interviews in January, some in February, etc. As stated above we construct 12 month aggregates and thus some span calendar years. To construct calendar year poverty estimates, we compute whether the 12 month expenditure

measure falls short of a weighted average of thresholds for calendar years spanned by the expenditure measure. For example, if the annual expenditure covers October 2009 to September 2010, we used the monthly average thresholds equal to $3/12$ of the 2009 threshold + $9/12$ of the 2010 thresholds. Since these are computed based on the final interview month for the household, we then weight each of these 12 month poverty outcomes by the proportion of months of data in the calendar year of interest.

d . CPI. The chained C-CPI-U is used when a price index is needed for anchoring the threshold, and in the computation of rolling five year averages for the minimum bundle of food, clothing, shelter, and utilities. We do not make geographic cost of living adjustments because of differences over time in the geographic sample frames. Meyer et al. (2022) note other concerns with geographic adjustments.

II. Poverty Thresholds

a. Consumption Threshold. We develop a threshold using methods similar to the the Census Bureau SPM thresholds based on a percentile of spending on food, clothing, shelter and utilities (FCSU) plus a little more (20% more) to cover other necessities. But it differs in that we construct a flow-based measure of FCSU for consumption poverty using housing service flows in place of housing expenditures. This threshold will apply to all housing types. We use the mean of the sample of consumer units at the 22-28th percentile of spending on this FSCU (referred to as the 25th percentile) plus "a little more" (20% more). This percentile of FCSU consumption produces a threshold similar to the 33rd percentile of mean FCSU expenditure across the three housing types used by the Census. We include estimates of in-kind aid in FCSU that are not explicitly included in spending (Women's, Infant's, and Children's (WIC) program, National School Lunch Program, housing assistance, LIHEAP) in the appropriate category of FCSU. This threshold is used for our SCPM. The threshold is computed as a five year rolling average as above, although we begin in 2009 and use

that year's FCSU, then two year's FCSU in 2010, and so on until we average the prior 5 years starting in 2014.

b. L-SEPM Threshold. The Liquid threshold tells the amount of liquid resources needed for the basic bundle, excluding expenses that are considered illiquid. Beginning with the consumption threshold, we adjust the bundle for a particular consumer unit by removing capped spending on housing (the flow) and capped in-kind aid, capped at the size of the FCSU component in the threshold. SNAP, WIC, and school lunch are considered as in-kind food aid. The threshold is a five year rolling average as in the consumption threshold above.

   The L-SEPM threshold is

$$1.2(\text{FCSU}) - \min(S_i, \text{S}) - \sum_{c=1}^{N_c} \min(G_c, I_{ci})$$

   where S_i is the individual household's housing flow (rental equivalence), S is the housing flow used in the basic bundle. For in-kind aid, G_c is one of the components of the basic bundle FCSU, and and I_{ci} is the in-kind aid received by household i corresponding to that type of transfer.

c. Income Poverty Threshold. The income poverty threshold more closely matches the original Census SPM thresholds in its treatment of housing. The thresholds are computed based on housing expenditure and computed separately by housing status, with a different threshold for home-owners with a mortgage, home-owners without a mortgage, and renters. The threshold is based the mean of consumer units outlays for those in the 30-36th percentile range of spending FCSU plus a little more (20% more) to cover other necessities. The threshold is computed as a five year rolling average where prior four years are adjusted to that year's dollars and averaged. For computation of the threshold, BLS treats each quarterly consumer unit interview as an independent observation. See Shrider and Creamer (2023). The Census Bureau

recently shifted to using 83 percent of the median consumer unit spending on the minimum bundle instead of the 33rd percentile of the distribution. We tested that alternative and found it to have higher poverty rates but not to affect any of the trends that we examine in our paper.

III. Resources

a. Expenditure. Gross expenditure is the outlays of a consumer unit, aggregated for four quarters. This CE expenditure excludes certain in-kind aid but implicitly includes SNAP in food expenditure. When in-kind aid estimates are included we denote it as "total resources." Outlays include interest and principal expenditure for vehicles and housing. For other durables, the CE data only records the purchase price, which we take to be the outlay. Credit card repayments are not included as expenses because they represent prior expenditures.

b. Liquid Resources. Beginning with gross expenditure, we exclude SNAP and other in-kind aid. We exclude expenditure on shelter by home owners since these expenses are illiquid in the sense that they are committed in advance and not available for the of purchase other components of the minimum bundle. For homeowners, these expenses include mortgage payments, insurance, property taxes, and home maintenance. We exclude interest payments and finance costs on credit cards and other loans. We exclude payroll pension contributions as illiquid but include non-payroll pension contributions as liquid on the assumption that the latter contributions could have been spent on the basic bundle. We do not deduct MOOP, work expenses or childcare to simplify our comparisons across measures.

c. Income. Income net of taxes, including in-kind and cash transfers. Income questions are asked in the fourth interview in CE. The interview asks about income during the prior 12 months. This time frame will match the 4 quarter aggregates of expenditure. For the Census CPS based income poverty in Online Appendix B, we use the Current

Population Survey (CPS) data from the historical series estimated by the Columbia CPSP (Wimer et al. (2023)). They use ASEC data from the Census Research Files after they become available in 2009. To make our version of SIPM more comparable to L-SEPM, we do not deduct MOOP, work expenses or childcare.

d. Consumption. Following Armstrong et al. (2022) and Garner et al. (2023a), we define consumption as total expenditures minus spending on education, childcare, cash contributions, contributions to retirement accounts, and insurance payments. We include estimated in-kind aid that has not previously been included in spending (ie. school lunch, WIC, LIHEAP, rent subsidies). We use housing flows (rental equivalence) in place of their expenditures. Thus consumption is the sum of expenditures on food, alcohol, clothing, transportation, entertainment, personal care, reading material, tobacco, and some miscellaneous items (e.g. credit card interest), and housing rental equivalence, major appliance spending, and utilities. Garner et al. (2023a) describes differences between their consumption measure (close to ours) and the measures by Meyer and Sullivan (2012) and Fisher et al. (2015). We treat vehicles differently from Garner in our consumption measure. We use vehicle expenses instead of vehicle flows in order to make the measure more comparable to L-SEPM. (See transportation below.) Another difference is that we do not exclude MOOP from consumption, in order to make it more comparable to our L-SEPM.

   Housing consumption. We use rental equivalence to measure the flow of services from housing, and we exclude housing expenditures for mortgage principal and interest and operating expenses. Rental equivalence for homes is based on the question "How much do you think it would rent for monthly, unfurnished, and without utilities?" For renters, we summed rent paid during the 12 month period. For shelter in the threshold, we use rental equivalence for the primary residence only. For consumption, we also include rental equivalence on vacation homes. Utilities are added.

e. In-kind aid. As noted, we estimate the added expenditure from in-kind aid that is not

captured in spending data as part of total resources. We include housing subsidies, national school breakfast and lunch, WIC, and LIHEAP. See the Fitzgerald and Moffitt (2022) data appendix for further explanation of estimates for school breakfast and lunch, WIC, and LIHEAP. SNAP is in-kind aid but is captured in spending data on food so is not separately added to food expenditure avoid double counting. We computed housing subsidies using the method in Garner and Gudrais (2018). For those households identified in CE as living in public housing or receiving housing subsides we impute a subsidy. The subsidy is the difference between the estimated market rent and the rent paid. We estimate market rent from the sample of unsubsidized renters by regressing rent paid on housing characteristics (number of rooms, etc) , year effects, state effects, an indicator for metro residence, and a selection correction factor. The selection correction is included because we the regression is based on the selected subsample of unsubsidized renters out of the population of subsidized and unsubsidized renters. The corrected regression coefficients are then used to estimate market rent for all households.

f. Transfers and transfer adjustment. We add cash transfers for public assistance and unemployment insurance to in-kind aid. We include the Earned Income Tax Credit (EITC) and the Child Tax Credit (CTC). These were estimated from TAXSIM using CE input data. To estimate the impact of the removal of transfer dollars on expenditure, we make an allowance that some of the lost transfers would be replaced by drawing down savings (including prior precautionary savings), borrowing, gifts from relatives, etc. as explained in the text.

g. MOOP, Work Expenses and Childcare. Online Appendix B shows income poverty measures after deductions for MOOP, Work Expenses and Childcare. Medical out of pocket expenses (MOOP) including health insurance premiums paid by households are measured directly in the CE. We use the reported value with negative values set to zero and cap it at family size times 6700 in 2011 dollars, updated for inflation. The

value of 6700 was the out-of-pocket maximum for Medicare for in network services, beginning in 2011. We apply that value, adjusted for inflation, to all years in order to have a consistent limit. In 2014, a change in the CE survey resulted in higher reported values for health insurance. To produce a consistent series, we increase MOOP by .26 times the reported health insurance amount in years prior to 2014. For the CPS, the Census Bureau imputes health insurance and estimates MOOP. The algorithm and survey questions have changed over time. See Bureau of the Census (2024). We use reported child care amounts directly from CE data and we estimate work expense as half of transportation expenses. We use half because the NRC 1995 report provided estimates that about half of transportation expenses were work related and half non-work related (See Citro and Michael (1995), p. 151). Mohanty et al. (2017) provide evidence that about 96 percent of work expenses were for transportation based on SIPP data. We ignore the remaining four percent for simplicity. Our sum of work expenses plus childcare is capped at the lower earnings of the head or spouse (if one). For CPS, work expense are imputed based on a percentage of median work expenses computed from SIPP data. Child care cost is measured directly. The sum of the amounts is also capped at the lower earnings of the household head or spouse. See Bureau of the Census (2024).

IV. The L-SEPM with Transportation. L-SEPMT

Transportation outlays include public transportation and ride services, vehicle rentals, plus vehicle payments (excluding down payments) , insurance, and maintenance. To estimate the flow of services from vehicles, we replace vehicle payments with an estimate of the annual depreciation of the vehicle(s) plus maintenance and insurance. We followed the method of Meyer and Sullivan (2012). This involves estimating the purchase price of each vehicle in each year and then multiplying by a make/year specific depreciation rate. All vehicle data is taken from the CE which includes make, year and age of owned vehicles. Details available upon request. Our flow measure differs from Armstrong et al. (2022) and

Garner et al. (2023a) in that they use a user cost approach that adds the opportunity cost of vehicle ownership (the real interest rate times vehicle value) and we do not.

For the L-SEPMT, we adjust the threshold by explicitly estimating and including non-work transportation in the basic bundle. Because non-work transportation was previously included in the Little More component of the threshold, we reduce the Little More to include only non-transportation items and then directly add an estimate for non-work transportation. NAS 1995 estimates a range for the total of non-work transportation and other components to be added to the "little More" centered around 20 percent. Direct evidence on the split between components is not provided. We use 15 percent of FCSU as our estimate of the non-transportation Little More components such as household supplies, reading materials, education books and supplies, and personal care items. Our results are sensitive to this choice.

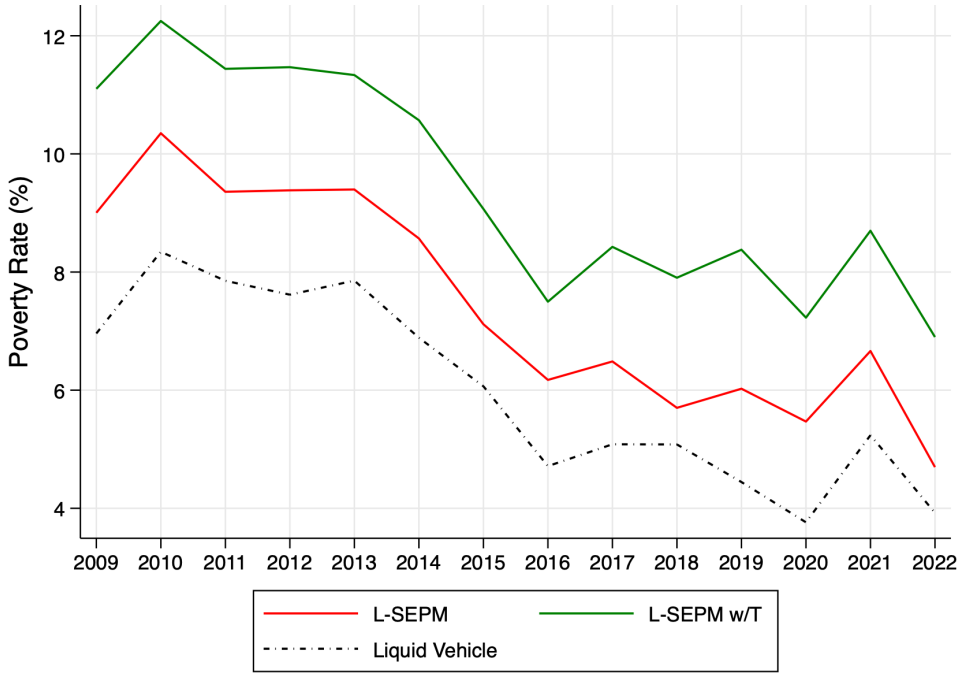
For transportation, we assume that half of total transportation expenses are work-related (denoted Tw) and half non-work-related (denoted Tnw). We define the threshold group the 22-28 percentile group of the flow measure of FCSU+Tnw. Similar to the adjustments for housing in the threshold, we subtract capped rental equivalent (flow) vehicle expenses (REV) from the threshold for vehicle owners, where the cap is the non-work transportation component of the threshold Tnw. The REV is the flow measure of vehicle cost (depreciation, insurance,and maintenance). Thus the threshold becomes

$$1.15\text{FCSU} + \text{Tnw} - \text{capped}(REV) - \text{capped housing} - \text{capped in-kind}.$$

On the resources side, we deduct illiquid vehicle costs for vehicle owners, namely vehicle payments, insurance, and maintenance (denoted VC). Thus resources become

$$E_i - H_i \text{ for owners} - VC_i \text{ for owners}.$$

Figure A1: L-SEPM with Transportation Sensitivity Test



Note: This figure presents sensitivity test results treating vehicles as fully liquid assets. We added the total market value of vehicles to resources and applied the same thresholds as in the L-SEPM including Transportation. This adjustment assumes the full vehicle value is available as resources; it does not account for outstanding vehicle loans, which are not observed in the CE.

Online Appendix B: Comparison of Income Poverty for CE and CPS based Census Measures

In this Appendix we compare our income-based SIPM to the Census income-based SPM. Our measure differs in several ways. First, we use CE data whereas the SPM uses Consumer Population Survey (CPS) data. Second, we did not make deductions for MOOP, child care, work expenses, or child support, as done in the Census SPM. We discuss these differences below and illustrate the differences in poverty time trends in Figure B1. Third, we do not make geographic adjustments in this comparison. We do this to avoid complications due to the different geographical sample frames between CPS and CE and changes in those frames over time. For the CPS measures we use data from the Census research files as made available by the the Columbia CPSP (Wimer et al. (2023)).

A practical difficulty in making comparisons between CE and CPS data is simply that they do not survey the same households. Differences in the accuracy of reporting of income and expenditure will therefore affect our comparisons and these differences cannot be separated from true differences in income and expenditure. Passero (2009) also notes that the calendar time periods do not match–CPS interviews in March and asks about the prior calendar year, whereas our CE measure averages rolling interview dates that can span multiple calendar years (as described in Online Appendix A). Past literature suggests that both surveys may underreport income(e.g. Bee and Mitchell. (2017), Meyer and Sullivan (2012), Meyer and Sullivan (2015)). Passero (2009) shows that CE income is lower than CPS income but not significantly so once imputations are applied, as they have been since 2009. The current BLS website illustrates a comparison of CE and CPS income and concludes that the trend in CE income estimates "track closely" with CPS income, although inspection of their figure reveals that CE income is somewhat underreported relative to CPS income. [39] [40]

[39] See BLS analysis dated January 24, 2023. https://www.bls.gov/cex/cecomparison/cps_profile.htm Accessed February 1, 2026

[40] Sabelhaus et al. (2015) show that income and expenditure underreporting in the CE is concentrated at the top

Figure B1 shows that our CE SIPM (blue) is usually a bit above the CPS SIPM (green) before any deductions/adjustments. But the measures show similar downward time trends after 2013, and an upturn in 2022. This is consistent with CE income falling below that from CPS. To make our estimates more closely resemble the Census SPM, we then make deductions for MOOP, child care, and work expenses. Figure B1 reveals that these deductions increase poverty rates by several percentage points for both measures. The CPS SIPM (dotted green) corresponds closely to the published Census SPM. It differs in that it is not adjusted for geographic cost of living, and it does not deduct the relatively small amounts of child support. The adjusted CE SIPM (dotted blue) shows higher poverty and initially declines more slowly than the adjusted CPS SIPM (dotted green) until 2017. Then they decline similarly. The deductions appear to increase poverty by more for CE poverty than for the CPS poverty.

Although we can make similar deductions in the Census CPS and our CE data, the components of these deductions are reported and imputed in different ways in the CPS and CE and the size of the resulting adjustments can differ. That is, these deduction amounts, themselves, potentially could cause the CE and CPS poverty measures to differ. The larger increase in CE noted above poverty suggests that the deductions are larger in the CE, and this is confirmed in Table B1. For the bottom income quintiles, the distribution of MOOP expenditure and work expense plus childcare is generally higher in the CE.

of the distribution, implying that poverty measurement based on these data is less affected than inequality estimates focused on higher-income households. The BLS has undertaken a multiyear project (the Gemini project) to improve CE income and expenditure data. See the discussion in Dillman and House (2013).

Figure B1: Income Poverty from CE and CPS Data

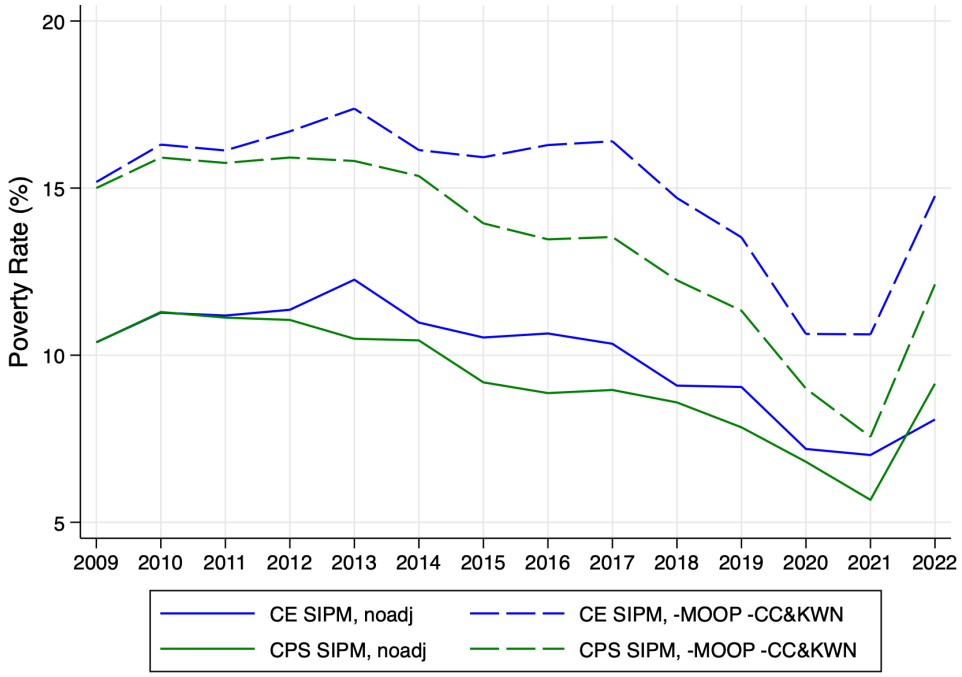


Table B1: MOOP and Work Expense Comparison

	2009		2022	
	CPS (Census)	CE	CPS (Census)	CE
MOOP				
Mean	$2,194	$2,213	$1,904	$2,862
p25	$0	$64	$83	$357
p50	$657	$1,241	$538	$2,068
p75	$2,623	$3,440	$2,353	$4,219
p90	$5,690	$5,983	$4,955	$6,939
Work Expense & Child Care				
Mean	$778	$1,348	$687	$1,541
p25	$0	$0	$0	$0
p50	$246	$277	$29	$0
p75	$1,596	$2,013	$1,335	$1,941
p90	$1,596	$3,826	$1,335	$4,403

Note: This table presents MOOP and Work expenses & child care costs based on bottom quintile of after-tax income plus SNAP, using the respective data source for each: the CPS ASEC and CE. All values are expressed in 2014 dollars