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ABSTRACT

Most poverty calculations use income-based or consumption-based measures. We introduce a new, third measure of poverty status which is based on household expenditure. Expenditure is the theoretically correct measure of resources actually transferred into a given period in the life cycle. But the presence of illiquid service flows from durable goods, which can only be used to purchase that good in the minimum standard of living bundle and no other good, requires an adjustment both to resources and to the poverty threshold to allow a proper comparison of liquid resources to liquidity-adjusted thresholds. We also show that the expenditure impact of transfers on the poverty rate requires an adjustment for effects of transfers on precautionary saving and for their role as consumption insurance. Using the 2009-2022 Consumer Expenditure Survey, our liquidity-adjusted poverty measure yields a 2022 poverty rate of 8.3 percent, declining by 11 percent since 2009. Our measure trends in broadly similar ways to income-and consumption-based measures but only because differences in how thresholds and resources are calculated are offsetting. We also find that accounting for precautionary saving and the insurance role of transfers could make the anti-poverty impact of transfers somewhat smaller than that estimated ignoring these effects.

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All major industrialized countries calculate rates of poverty in their societies, examine both levels and trends, 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 disposable, for example). 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. Although less common internationally, some countries, including the U.S., have rates of poverty calculated using consumption, which is conceptually a different measure than income because income is intended to measure potential resources, whether used or not, while consumption is a measure of potential resources actually used.

In this paper we propose a new, third 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 to 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 superior measure of resources, we also propose making adjustments to the poverty threshold. 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 not be poor and liquid resources defined as resources that can be used to purchase any good in the threshold (i.e., which can be used to purchase anything). 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.

The first and most important conceptual change we make to standard poverty measurement is to replace income as the measure of resources with expenditure. While a number of authors (Cutler and Katz (1991),Slesnick (1993) have used expenditure instead of income for poverty measurement, most have intended it to proxy consumption, but consumption reflects the use of resources and is not a measure of resources per se, and hence is conceptually different than a resource-based measure. We show that the well-known life cycle model of two-stage budgeting implies that the correct measure of resources 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, credit card borrowing, borrowing and gifts from other sources (payday loans, gifts and loans from friends and family) and hence captures all sources of potential resources actually used. And while income includes saving and expenditure does not, saving represents a measure of potential resources, not a measure of resources actually used, which is the concept we employ.

A key distinction to be made in calculating any poverty measure is, relatedly, whether one wishes to have a measure of actual resources used or a measure of potential resources, including those unused. Unused resources include, for example, net worth (assets minus debt, with assets including borrowing power). The two are distinct concepts. Using income represents an attempt to measure potential resources but it excludes potential resources from borrowing and other forms of obtaining extra resources and, more generally, ignores net worth. Using expenditure represents an internally consistent measure of actual resources used and has the virtue of corresponding to a clean theoretical concept. It does not attempt to measure potential resources, which should be measured in a much broader way than current saving or borrowing in the first place. We leave that task for future research and explore, in this paper, the implications of using actual resources used for the calculation of levels and trends in the rate of poverty.

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 49 percent of the bottom quintile of the expenditure distribution owning a home and 62 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)).[1] 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 deemed to be necessary for a minimum standard of living, the illiquidity of those flows 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 adjust the poverty threshold instead 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.[2]

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

[1] Consumption poverty measures always use service flows. See Section III-B below

[2] Ziliak et al. (2023) also proposed this.

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 measure 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 poverty rates, how the illiquidity of in-kind transfers affects poverty rates, and how the impact of transfer payments affect poverty rates 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 at the bottom. We also demonstrate 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. Finally, we compare our expenditure-based poverty rates, both in levels and trends, to those using income-based and consumption-based poverty measures.

We calculate our L-SEPM poverty rate in 2022 to have been 8.3 percent. But we find that if the illiquidity of housing flows were ignored, the rate would be a full percentage point lower, at 7.1 percent, although the illiquidity of in-kind transfers has essentially no impact on the rate of poverty. In addition, despite the difference in the levels of our L-SEPM poverty rate and those of other income poverty rates, our L-SEPM poverty rate has trended downward, on average, since 2009, as shown in reports using income poverty as well. In our 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 might rise by much less, if at all, compared to the amount of the increase that would be calculated if insurance and precautionary savings effects are ignored. We also estimate the effect on the poverty rate if a basic need for transportation were added to the list of necessities, finding that such an addition would raise the rate of poverty by about one percentage point. A comparison of our measure to an income-based measure and a

consumption-based measure shows them to have somewhat similar levels and trends, at least on average, but the similarities are the result of offsetting differences in our measure and those measures related to how the threshold is defined, how illiquidity is treated, and inherent conceptual differences in consumption and resources.

Our work builds on the large and important body of existing literature on poverty measurement. Our expenditure 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 it 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 paper. As noted previously, some older papers proposed the use of expenditure to measure poverty rates, but intending it to measure consumption, which it does not. The Census Bureau, in cooperation with the Bureau of Labor Statistics regularly proposes new methods, some of which are related to our proposals. Several of our proposals are related to those in 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 of Citro and Michael (1995) and subsequent implementation of the conceptual framework proposed by those authors by the U.S. Census Bureau, and our paper is likewise heavily influenced by that tradition.[3]

We note two important limitations of our measure. One is the aforementioned use of actual resources used in a period and not potential resources. We leave work on potential resource measures for future research. The other is that we do not deal with the important problem of how to incorporate health insurance and the Medicaid program into poverty measurement. Work is

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

proceeding on that topic (Korenman et al. (2019),Ziliak et al. (2023),Creamer (2024)). We hope to incorporate it into our measure in the future.

The outline of the paper is as follows. In the first section, we exposit the theoretical bases for our four contributions. The following section discusses the data we use, followed by a section with our central results. Subsequently we compare our poverty measure to income-based measures and consumption-based measures. A short 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, our use of it is only to point out that it leads to a measure of resources equalling total expenditure in a period. Showing this is not complicated 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)).[4] 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 in 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. The literature on financial resources of low income families makes clear that credit card borrowing and informal loans from payday lenders, friends and family, and other sources (all net of interest paid in the current period on past loans) are at least as important as, if not more important than, liquid assets in providing additional resource flows. We add these

[4]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 and reflects 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.

sources of resources explicitly in our flow equation, given their importance. But, to stay consistent with the notation for liquid assets, we formulate both forms of debt as drawdowns of an asset. Defining M^c as the credit limit on a credit card and m_t^c as the minimum payment at time t, equal to the interest rate on credit card debt at $t-1$, $A^c = M^c - m_t^c$ represents the asset value of a credit card at time t which can be drawn upon for current consumption. Likewise, defining M^i as the maximum amount of loans available to the household at time t from informal sources and m^i as the minimum payment due on those loans (possibly zero for friends and family), $A_t^i = M^i - m_t^i$ is the value of the asset arising from this source of borrowing that can be drawn upon for current consumption. Relabeling financial assets as A_t^f, the financial flow equation becomes

$$C_t = Y_t + rA_t^f + (A_t^f - A_{t-1}^f) + (A_t^c - A_{t-1}^c) + (A_t^i - A_{t-1}^i) \tag{4}$$

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, while others are net borrowers or net savers, with consequent rises or falls in current consumption, respectively. An analogous interpretation can be made for informal loans. Again, total expenditure (consumption) (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.

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.[5] It is probable that the conventional view that low income households do little saving and hold few liquid assets, and possibly do little credit card borrowing, describes the very poorest households, but not necessarily those who are somewhat better off.[6] 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

[5] We ignore transfers for this exposition.

[6] Mann (2009) has an in-depth analysis of credit card use among low-income households.

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 (and, for our conceptual purposes, likely to be drawn down and used to finance current expenditure). Appendix Table A2 shows tabulations from the Consumer Expenditure Survey 2009-2022 for families in so-called deep poverty (expenditure less than half the threshold), those in so-called shallow poverty (expenditure between 50 and 100 percent of the threshold), and those in near poverty (100 percent to 150 percent of the threshold). For those with heads less than age 65, the 75th percentile of the liquid asset distribution for those in near poverty is $780 and the 90th percentile of those in shallow poverty is $1,550 and equal to $4,459 for those in near poverty, all high enough to make a difference to expenditures of households in those ranges, for what matters for poverty rates are not medians and means, which are typically quite low for liquid assets, but distributions and whether those push a fraction of families above or below any particular threshold. Likewise, the 90th percentile of credit card balances for the near poor with heads under 65 is a non-trivial $2,329. Liquid assets for those with heads over 65 are much larger, where the 90th percentile for even the deep poor is $1,027, $2,534 for the shallow poor, and $19,495 for the near poor. These large right-hand tails are typical of asset distributions and are large enough to affect poverty rates if those assets are used to raise current expenditure.

As for payday loans, 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 is from the Survey of Consumer Finances, 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, there is no representative statistical evidence but one ethnographic study examining 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)).

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

$$C_t + Q_t + L_t = Y_t + rA_t^f + (A_t^f - A_{t-1}^f) + (A_t^c - A_{t-1}^c) + (A_t^i - A_{t-1}^i) \tag{5}$$

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. The proper way to handle that illiquidity is to subtract them from resources:

$$C_t + Q_t = Y_t + rA_t^f + (A_t^f - A_{t-1}^f) + (A_t^c - A_{t-1}^c) + (A_t^i - A_{t-1}^i) - L_t \tag{6}$$

showing that expenditure on nondurables and new durable purchases equals resources allocated to the period minus any loan payment. The LHS is what we term "liquid" resources allocated to the period, defined as resources that can be used to purchase any consumption good.[7]

The second liquidity issue depends on how the threshold is defined. Assuming one defines the threshold as the expenditure needed for the consumption of a specific minimum, fixed bundle

[7]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.

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 number of goods in the threshold. We call this threshold concept the concept of a "minimum bundle."[8] 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 the actual service flow, the threshold entry for the durable good should not be G_j but should be $Max(G_j - S, 0)$. Service flows below the minimum imply that liquid resources are needed to purchase more of the good if the minimum is to be reached, 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.[9] [10]

We should note that this treatment of service flows as illiquid ignores the possibility that

[8]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.').

[9]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, which is a different concept. Alternative definitions of the threshold would lead to a different treatment of durables.

[10]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.

durables like homes and vehicles can in principle be used to generate liquidity. Durables can be sold or rented, for example. Durables which have existing debt can be refinanced if interest rates fall, and homes with significant equity can be used to generate liquidity through home equity loans. On one level, given our conceptual framework as measuring only lifetime resources actually allocated to a period, we are only interested in the degree to which households actually employ these methods. The CE data show that only one half of one percent of homeowners in the lowest quintile of the expenditure distribution actually have home equity loans, and we do not observe any families renting out homes. We cannot observe refinancing but we find little selling of homes in the data. But, on a larger level, 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 the 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. Our assumption of complete illiquidity of service flows is an approximation justified by these results.

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. They can be used only to contribute toward meeting the minimum consumption of a good in the threshold. 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 (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, and our treatment of adjusting the level of the threshold instead of the level of resources differs from the approach taken in the existing literature.[11]

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 from 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. [12]

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

[11]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).

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

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.[13] 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 approximately observed in the data. As we have noted above, liquid assets are not zero for the households with expenditures in the 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.[14] 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

[13]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.

[14]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.

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 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.[15]

II Data and Variable Construction

We use the Consumer Expenditure (CE) 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 across a large number of categories (we use only what is called the "Interview" survey). We start with the 2009 survey because that is the starting year for the income poverty measure produced by the U.S. Census Bureau and we use all surveys through 2022.[16]

For the construction of the threshold, we follow the general method adopted by the U.S.

[15]There is also a very large literature in macroeconomics on the consumption response to stimulus transfers during recessions and, more generally, in response to inocme shocks of various types. See Crawley and Theeloudis (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.

[16]We treat each consumer unit interview as an independent observation, consistent with Meyer and Sullivan (2012) and BLS treatment and discussion by Armstrong et al. (2022), apply sample weights, and assign quarters to the appropriate calendar years.

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 (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.[17] We calculate an expenditure amount for food, clothing, and utilities and a consumption amount for shelter (see below) for each household and, like the Census Bureau's current procedure, add four government in-kind transfers which 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).[18] Totals of the four goods are then summed. Again following the Census, we examine the distribution of that sum across all households and select a percentile point of that distribution as the poverty threshold, deem that point 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.[19] [20] 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.[21] As an additional comparison, we also compare our poverty measure to that using so-called

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

[18] 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`.

[19] We make the same family size and geographic adjustments to the threshold as the Census Bureau, for comparability. See the Appendix.

[20] 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 the Appendix 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.

[21] "...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.)

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.

Our primary differences with the Census Bureau and standard practice in the construction of the threshold are three, with two of them related to durables and one related to in-kind transfers. We noted all three in the previous section but provide more detail here. First, for the calculation of the consumption of shelter, we use an estimated service flow for homeowners instead of any measure of housing expenditure. Service flows are the more appropriate concept of consumption of durables. We calculate housing service flows using a CE question asking homeowner respondents 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.[22] 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. As we will describe below, the Census Bureau uses a housing expenditure value for the threshold, and this will generate differences in our two estimated poverty rates. But to reduce the differences, we set the percentile point of our distribution of MB consumption in 2009 to be the percentile point which yields an MB consumption amount equal to the mean expenditure amount in the Census threshold. The Census Bureau has historically used an approximate 33rd percentile point of their MB expenditure distribution for the poverty line, and this is equivalent to approximately the 25th percentile point of our MB consumption distribution in 2009. The higher percentile for the consumption distribution reflects the fact that our entire

[22]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)). Most surveys do not have such a question and must impute that rent with other methods.

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). We therefore use the 25th percentile point for our initial set of poverty rate analyses.[23]

Our second difference is that we recognize the inherent illiquidity of service flows from homes by subtracting from each homeowner's threshold the amount of their home's service flow, but capped by the MB amount for housing consumption in the threshold, as noted in the previous section. This reduces their housing consumption "need" by the amount of consumption in the form of a service flow they are already receiving. The housing consumption remaining in the threshold is therefore $Max(S-F,0)$, where F is their housing service flow and S is the shelter consumption amount in the MB. Service flows in excess of the MB do not reduce the threshold needs for other goods and do not constitute liquid resources available for the purchase of other needs.

Our third (partial) difference with much practice is to likewise subtract in-kind transfers from the threshold but again capped by the amount of the relevant goods in the MB. The major inkind transfers are those for housing subsidies, food subsidies, and utility subsidies, which reduce the need for the shelter, food, and utility components in the MB.[24] They are again capped at the value of each of those goods in the MB.[25]

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

[23]We use the average of the 22nd to the 28th percentile points for our threshold calculation. The Census Bureau has 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.

[24]Food-related transfers include those from the Supplemental Nutrition Assistance Program (SNAP), the National School Lunch Program, and the Women, Infant's, and Children's (WIC) program.

[25]As noted previously, the Census Bureau adds capped housing subsidies to resources, which is an equivalent treatment, but adds uncapped food subsidies and LIHEAP.

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 not reported by respondents, but minus what we term housing "expenses," which are expenses contractually or 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.[26] We also subtract SNAP benefits from expenditure because they are included in food expenditure reported by CE respondents yet are illiquid because they can only be used for one consumption good.[27]

In one respect, we do not follow the Census Bureau, which deducts medical out-of-pocket expenses, work-related expenses, and child care expenses from income to arrive at a net income measure to compare to the threshold. While these items can all be argued to be illiquid, our initial calculations of these amounts in the CE differ in amount and distribution from those used by the Census Bureau. This generates differences in our poverty rates and those calculated by the Census Bureau but for data reasons and not because of the use of expenditure per se, definition of the threshold, illiquidity considerations, or counterfactual effects of transfers. We show alternative poverty rates after deducting these measures separately, in the Appendix.

Appendix Table A3 shows descriptive statistics for the variables in our sample. The mean threshold across all U.S. households was about $24,000 in 2009 and $27,000 in 2022 (i.e., means over the 22nd to 28th percentile points of the consumption minimum bundle distribution). The standardized threshold for a two-adult, two-child family was slightly higher (many households have fewer adults or children and hence lower MB amounts), with shelter comprising the largest component (37 to 40 percent of the total MB), with food consumption the next largest. Liquidity-adjusted thresholds (i.e., subtracting illiquid service flows and in-kind transfers) reduce

[26] By subtracting housing expenses from resources and subtracting housing flows from the threshold means that we are implicitly considering the net benefit of housing, i.e., current service flows minus current expenses.

[27] Our measure is necessarily after-tax since taxes paid are not available for purchase of the goods in the MB.

the amount of liquid resources needed to purchase the remaining bundle by about a third, with the 20th percentile equaling about $10,700 in 2009 and $11,300 in 2022. On the resource side, mean total expenditure including unreported in-kind transfers ranged from $55,000 to $64,000 and reported CE expenditures (which exclude those in-kind transfers) was very slightly less, while liquid resources (CE expenditures minus housing expenses and SNAP) ranged from $45,000 to $52,000. The 20th percentile of the liquid resources distribution was about $22,000 in 2009 and $25,000 in 2022, nearly double the corresponding percentile of liquidity-adjusted thresholds. While the poverty rate is determined by the joint distribution of the two, this does suggest that our poverty rate is likely to be well less than 20 percent. Mean housing service flows (including zeroes for renters) ranged from about $12,000 to $15,000 between the years (but this for the full population) and in-kind transfers (including zeroes for non-recipients) ranged from about $650 to about $1,000.

III Results

A The L-SEPM

The L-SEPM poverty rate in the last year of our data, 2022–the fraction of all individuals in 2022 living in households with liquid resources below their liquidity-adjusted thresholds–is 8.3 percent.[28]

Impact of Liquidity Adjustments. Table 1 demonstrates the importance of liquidity adjustments in 2022 for the bottom quintile of the total (not liquidity adjusted) expenditure distribution in the U.S. Because the adjustment for illiquid service flows and illiquid housing expenses for homeowners is of major importance, separate columns for households of three

[28]This is not comparable to the Census Bureau income poverty rate of 12.4 percent (Shrider and Creamer (2023) not only because of the differences in our expenditure measure which we have already discussed but partly as well because the deductions mentioned in the last section are not deducted. See the Appendix for a replication of the Census Bureau estimate.

different housing types are also shown–homeowners with a mortgage, homeowners without a mortgage, and renters. The mean non-liquidity-adjusted threshold is about $28,000 in this segment of the population and is not far different by housing type. But adjusting the threshold for illiquid housing service flows and in-kind transfers reduces the threshold by about a fourth, down to about $21,000. The adjustment is larger for homeowners and smallest but non-trivial for renters, whose adjustments are only from in-kind transfers.

Total, non-liquidity-adjusted resources including unreported in-kind transfers is about $22,800 for this bottom quintile and about $21,700 excluding those transfers (which is the expenditure amount reported in the CE). Subtracting illiquid SNAP and housing expenses and Census adjustments results in a liquid resources measure of about $19,000. The liquidity adjustments are very different by housing type, for mean liquid resources for homeowners with mortgages are about $16,000 while those for homeowners without mortgages and renters are considerably larger.

The second and third panels of Table 1 show the impacts of the four liquidity adjustments to the threshold, with the second panel showing adjustments only for those who have them and with the third panel showing mean adjustments over the full population. The second panel shows that mean capped housing service flows for homeowners are about $7,300 and are somewhat higher for homeowners with mortgages. But more than three-quarters of homeowners have housing flows greater than the MB amount for housing consumption, and the mean flow above the MB amount is about $6,700. As already emphasized, this is the amount of service flow unavailable to purchase other goods in the MB. Renters who receive in-kind housing subsidies have capped subsidies of about $6,500 and about a fifth have subsidies exceeding MB housing consumption, but the mean amount over the MB value is only $168 on average. This small amount is unlikely to move many households over the threshold. Capped food subsidies are large, ranging from about $2,400 to $3,400, and between 6 and 12 percent have subsidies over the MB food consumption

amount. The mean amounts over the cap vary over the housing type groups but are less than $200. Energy subsidies are small and essentially are never over the MB amount for utilities.

But the impact of these adjustments on the poverty rate also depends on the fraction of homeowners in the population and the fraction of households receiving in-kind transfers. About half the households in this part of the expenditure distribution are renters and only about 10 percent are homeowners with mortgages. The third panel of Table 1 shows that the percents of households with liquidity adjustments are necessarily much smaller. While over a third (37.8 percent) of all households have housing service flows in excess of their MB housing consumption amounts, only 2.8 percent and 4.2 percent of households have housing subsidies and food subsidies, respectively, exceeding their MB amounts, and essentially no households have energy subsidies exceeding the MB utility amount.

Figure 1 shows the impact of our liquidity adjustments to thresholds and resources by comparing our the poverty rate under our treatment to the alternative of adding uncapped housing flows and uncapped in-kind transfers to resources. The difference between the two is only a function of flows and transfers which exceed their MB amounts and whether those amounts move households over the threshold. Our 2022 L-SEPM poverty rate of 8.3 percent would drop by a little over a percentage point, down to 7.1 percent, if housing service flows for homeowners were added, uncapped, to resources; or, expressing it in the opposite way, the poverty rate is more than one percentage point higher because of housing service flow illiquidity.

However, Figure 1 shows that additionally adjusting for the illiquidity of in-kind transfers has effectively no effect on the poverty rate. This is partly because those transfers are rarely in excess of the corresponding MB amount of the good in question (ranging from 0 to 6 percent in the bottom quintile) and partly because the amounts over the MB values are small for those whose amounts exceed the MB values. An inspection of the data shows that almost no households below the threshold are moved over the threshold by the small downward threshold adjustments for

in-kind transfers.

Differences by level of the threshold. The level of the threshold is a subjective, socially-defined object and the threshold we use, pegged to approximately equal that used by the Census Bureau, is arbitrary in that sense. A common way of considering alternative thresholds is simply to consider thresholds that are one-half that of the initial threshold and that are 50 percent greater. The first commonly defines "Deep Poverty" and the latter defines "Near Poverty." Our interest is whether the liquidity adjustments make larger or smaller effects at those threshold levels than at our initially chosen level.

Figure 2 shows that our liquidity-adjusted, L-SEPM Deep poverty rate in 2022 is about half of one percent and the Near Poverty rate is almost 26 percent. Adjusting the threshold for the illiquidity of housing service flows lowers the Deep poverty rate by only a fraction of a percentage point (although larger in percent terms). Adjustments for the illiquidity of in-kind transfers also has only a small effect but a larger percent effect than in Figure 1 because households at the lower level of resources in the Deep poverty region have, proportionately speaking, higher rates of capped in-kind transfers and larger amounts over the cap. But the adjustments have a smaller effect at higher levels of resources. Ignoring the illiquidity of housing service flows would lower the Near poverty rate from 26 percent to about 24 percent, a larger absolute but smaller percent reduction. In-kind transfers are much less important at these higher level of thresholds and their illiquidity has no impact on the rate of Near Poverty.

Trends. Figure 3 shows the trend in the L-SEPM poverty rate since 2009, showing a long-term but modest decline from about 11.5 percent in 2009 to the 8 percent in 2022 we have already presented. However, the decline primarily occurred prior to 2016, a period when our real consumption threshold grew at low rates or even occasionally declined but real liquid resources were rising (essentially no growth in the real threshold from 2009 to 2016).[29] After 2016, the

[29]The occasional real decline was because consumption expenditures during the Great Recession and the early recovery period after it was a result of declining real expenditures on the MB goods at the bottom of the distribution.

failure of our poverty rate to continue to decline at the same rate was a result of several factors. One was an increase in consumption of the MB goods at the bottom of the distribution, leading to a sharp increase in the rate of growth of the 25th percentile of MB consumption (an average of 2.5 percent real increase per year over the 2016-2022 period, with increases in the real shelter component most responsible). A second contributing factor was an acceleration in the growth of real, illiquid housing expenses for homeowners after 2016.

An additional feature of our trend results is that the poverty rate increased in 2020, the height of the Pandemic, contrary to the decline in the poverty rate generally found in income poverty studies (Shrider and Creamer (2023)). There are three reasons for the increase. One is that total expenditure rose less than income during the first year of the Pandemic because, while government transfers increased income, expenditures in many sectors–travel, hospitality, dining, and other sectors–fell as those sectors mostly shut down. But total expenditure did rise somewhat in aggregate from 2019 to 2020, although modestly, which would ordinarily reduce the poverty rate. The second reason for the rise in the poverty rate we find was a result of the continued sharp rate of increase in the threshold just described. A third factor is that illiquid housing expenses for homeowners jumped from 2019 to 2020, with a real growth rate of 9.1 percent in the bottom quintile of the liquid resource distribution compared to growth rates of 0.3 percent and 5.1 percent in 2018-2019 and 2020-2021, respectively.[30]

Figure 3 also shows the trend in the poverty rate from 2009 to 2022 if housing service flows and in-kind transfers were not capped at their MB amounts and were added to resources. The reduction in the poverty rate from using uncapped flows and in-kind transfers fluctuated to a small degree over time–with housing flows the dominant factor–but the difference was not far from the one percentage point difference we noted for 2022 for most years, implying that housing flows at the bottom of the distribution rose by about the same amount as the shelter portion of the MB over

[30]Statistics on US spending confirm these CE figures. National spending in almost every major category fell in 2020, with the exception of housing expenditures, which rose instead. See `https://www.bls.gov/opub/reports/consumer-expenditures/2020/pdf/home.pdf`.

our observation period. The results also show that if the illiquid housing flows had been treated as liquid, no rise in the poverty rate would have occurred in 2020, implying that those excess flows would have been large enough to outweigh the factors pushing the poverty rate up just described.

Figure 4 shows trends in our liquidity-adjusted measure had been held constant in real dollars, a measure of what is termed "absolute poverty" in contrast with the relative poverty measure we have used thus far, which uses a threshold that can rise over time in real dollars if real consumption on the MB goods rises at the bottom of the distribution. The trend in the rate after 2016 is now negative, confirming that it was partly the rise in the threshold after that date that tipped the trend from strongly negative to a mildly negative trend. There is also no longer a rise in the poverty rate in 2020, indicating that the threshold change was a factor in the Figure 3 result. Figure 4 also shows trends in absolute poverty if illiquid housing flows and in-kind transfers had been included in resources, with the differences generally following the pattern of differences in Figure 3.

There are two issues related to price indices when calculating absolute poverty rates. One is that low income households consume a different bundle of goods than the general population so a price index specifically for low income households should be used.[31] But a second issue is that, if the concept of a Minimum Bundle is taken seriously, as it is here, a price index is needed specifically for the goods in the bundle and which changes over time only because of changes in prices of each of the goods in the bundle. While a full treatment of this issue is reserved for future work, we show in Appendix Figure A2 absolute poverty rates when using a price index which at least uses separate weights and prices for housing and non-housing goods, which we choose given the importance of shelter needs in our threshold concept (we do not separate out the other MB goods–food, clothing, and utilities).[32]. The figure shows an almost identical trend to that in Figure

[31] BLS produces a price index by quintile of the equivalized income distribution which could be used for this purpose. See `https://www.bls.gov/cpi/research-series/r-cpi-i.htm`.

[32] We thank Bradley Akin of BLS of assistance in constructing these indices and thank the Assistant Commissioner of the BLS for granting us confidential access to some of the underlying data.

4, implying that the trends in housing and non-housing prices over the period were very close to one another, at least for this time period.

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 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 that framework, 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. 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 their total expenditure and, for illustration, 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.[33]

For precautionary saving, we illustrate the potential for 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

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

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 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.[34][35]

The impact of this illustrative exercise on the anti-poverty effects of transfers in 2022 is shown in Figure 5. Simply removing all transfers and ignoring all impacts on expenditure, similar to the current methodology in the literature, would raise the expenditure poverty rate by almost 7 percentage points, up to 15 percent from our initial 8.3. Making our precautionary saving and insurance adjustments would result in a poverty rate a little less than 5 percentage points higher instead, making the anti-poverty impact of transfers about 28 percent smaller. 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 precautionary savings impacts are accounted for and when only insurance impacts are accounted for. The anti-poverty impacts of transfers are much greater when the insurance effects

[34]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.

[35]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.

are used than when precautionary savings effects are used (poverty rate only rises to about 9 percent).

Figure 6 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 a growing anti-poverty impact over time, lowering the poverty rate by about 6 percentage points in 2009 and by about 7 percentage points in 2022. This is consistent with much work using income poverty measures showing the growing 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, remaining at 4.9-to-5 percentage points in both years. While only illustrative, this does demonstrate the potential importance of the issue.

Transportation. Finally, we explicitly add Transportation to the Minimum Bundle, as 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 current list of necessities–food, clothing, shelter, and utilities–and we pick the 25th percentile of that distribution as the poverty threshold. But we exclude work-related transportation from the addition to the threshold because that is a work expense and does not constitute direct consumption. There appear to be no reliable estimates of what fraction of transportation expenditures in the population are work-related and what fraction are non-work-related, so we rely on the informal estimate of one-half suggested by Citro and Michael (1995).[36] For the threshold calculation we also follow previous procedures of adjusting for family size and geographic location.

[36]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 the Appendix for details.

We address three issues when introducing transportation. First, 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 replace vehicle payments with an estimate of the annual depreciation of the vehicle(s) for owners. [37] And for all households, including vehicle owners, we include transportation expenditures for public transportation, gasoline, and vehicle rentals. Transportation flows for vehicle owners and transportation expenses for non-vehicle owners are used for the measure of transportation consumption in the calculation of the threshold.

Second, we follow our previous liquidity adjustment by subtracting (one half of) transportation service flows for vehicle owners from the threshold, again treating that flow as illiquid and unavailable for the purchase of other goods. We again cap the amount subtracted by the MB threshold amount for transportation. Third, for all households we reduce liquid resources by deducting work-related transportation, taken to be half of transportation expenses. For vehicle owners, we further reduce liquid resources by subtracting the costs of owning and maintaining a vehicle in excess of work-related transportation, similar to our subtraction of necessary housing expenses for homeowners. These expenses include any loan payments, insurance, and maintenance. [38]

Figure 7 shows the impact of adding transportation to our liquidity-adjusted, L-SEPM poverty rate in 2022. The poverty rate would rise from about 8.3 percent percent to about 10 percent from changing the threshold alone, not surprisingly since adding another good to the MB means that resources, other things being equal, need to be greater to purchase that MB (and still using the 25th percentile point for the threshold). But subtracting the capped service flow for vehicles from the threshold for vehicle owners would lower the poverty rate back down to about

[37] We followed the method of Meyer and Sullivan (2012). Estimating depreciation involves calculating the purchase price of each vehicle in each year and then multiplying by a make/year specific depreciation rate. What we term the "service flow" from vehicles is this depreciation plus operating expenses.

[38] For vehicle owners, we deduct the maximum of work-related transportation and the costs of owning and maintaining a vehicle, thus avoiding double counting. See the Appendix for details.

8.3 percent again. But subtracting work-related transportation and excess illiquid vehicle expenses for vehicle owners from liquid resources raises the poverty rate, back up to about 8.8 percent. Our final poverty rate is about one-half a percentage point higher than our poverty rate that ignores transportation.

Figure 8 shows the trends in the L-SEPM poverty rate after adding, sequentially, each of the 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 work-related transportation and 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 over time, on net all increased in importance. The impact of including transportation in the MB on increasing the poverty rate, the impact of subtracting capped vehicle service flows from the threshold on decreasing the poverty rate, and the subtraction of work-related transportation and illiquid vehicle costs from vehicle owners in increasing the poverty rate, were all greater in 2022 than in 2009. But these trends offset each other, leaving the impact of adding transportation ending with almost the same percentage point impact in 2022 (0.9) as it had in 2009 (0.8).

B Comparisons to Other Measures

Income Poverty. We compare our liquidity-adjusted L-SEPM measure to an income poverty measure similar to that constructed by the Census Bureau. We term our constructed income poverty measure the Supplemental Income Poverty Measure (SIPM) in terminological analogy with the Census Bureau's SPM. Our measure and the Census income poverty measure differ on both the threshold and resource sides. On the threshold side, we have chosen the same four MB goods as the Census and we add the same in-kind transfers to the MB quantities reported in the CE. However, the major difference is in the treatment of shelter, where we use housing service

flows of homeowners to arrive at an estimate of housing consumption but the Census Bureau instead estimates housing expenditure separately for homeowners with mortgages, homeowners without mortgages, and renters, and uses a separate expenditure threshold for each. Each group is regarded as having different housing expenditure needs which require them to have different amounts of income to meet those different needs (e.g., homeowners with mortgages need more income than homeowners without mortgages). This is an indirect way of capturing needed liquid resources but the use of expenditure instead of housing service flows is likely to make a significant difference with our measure, for housing service flows do not equal housing expenditure.

This difference also may affect trends over time. Our choice of the 25th percentile of the MB consumption distribution was picked because it equals mean expenditure in 2009 in the Census Bureau's thresholds and hence yields some degree of comparability in the level of the threshold. But in addition to the use of three different thresholds by Census, trends over time will be affected if housing consumption trends at a different rate than housing expenditure.[39] Our deduction of housing service flows and in-kind transfers from the MB amounts will also lead to differences in the threshold, but the subtraction of the latter is likely to make little difference because those transfers are rarely in excess of the MB amounts, which means by adding them to resources, as the Census Bureau does, is equivalent.

On the resource side, income and expenditure will differ, as we noted earlier in our paper, if households do any saving, which is in income but not in expenditure, or if households borrow on credit cards or from other sources, which is included in expenditure but not in income. But a likely more important difference is that we deduct homeowner housing expenses from expenditure to arrive at our liquid resources measure but the Census Bureau does not, instead dealing with that on the threshold side, as just described. This difference again just follows from the conceptual differences in the two measures.[40]

[39]But we use the same geographic adjustment and family composition equivalence scale as Census, for comparability.

[40]As noted previously, we do not deduct medical out-of-pocket spending, work-related expenses, or child care

We construct our SIPM from the same Current Population Survey data used by the Census Bureau.[41] One consequent practical difficulty in making comparisons between our L-SEPM and the SIPM we construct is that they use different data sets with different households, so comparisons cannot be made for the same households. Differences in the accuracy of reporting of income and expenditure will therefore affect our comparison but these differences cannot be separated from true differences in income and expenditure.[42].

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 income 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 poverty measures. We generally follow methods used in past work on consumption poverty (Meyer-Sullivan 2012, Armstrong et al. 2022, Han et al 2022, Garner et al.

expenses from resources, as the Census does, for reasons noted earlier. See the Appendix for poverty rates after these items are deducted.

[41]We use the files made available from the Center for Poverty and Social Policy; these use the Census Research Files after 2009 (Wimer et al. 2023).

[42]The CE does have income questions but they are widely regarded as being low in quality (`https://www.bls.gov/cex/cecomparison/cps_profile.htm`) However, it has been used to make comparisons with consumption Fisher et al. (2015)

2023, Meyer-Han-Sullivan 2024.[43] We calculate consumption in each year as the sum of nondurable expenditure and housing services flows for homeowners (and housing expenditure for renters), but excluding expenditures on goods regarded as directed toward saving or investment in past work–education expenses, personal insurance, cash contributions to retirement plans, and child daycare (which we instead treat as available to purchase the MB). Two differences in our consumption measure and that in some past work are that we use vehicle expenditure instead of vehicle service flows and we do not deduct medical out-of-pocket spending or work-related expenses from consumption. The former is for comparability with our baseline L-SEPM measure, which only addresses the treatment vehicles in a separate exercise where transportation is more formally introduced to the measure (see above) and the latter is only examined in the Appendix for reasons denoted earlier.

On the threshold side, the papers in the consumption poverty literature have not used the relative poverty threshold concept based on an MB that Citro-Michael proposed and which the Census Bureau adopted for its SPM, and which we use in modified form, instead generally using absolute poverty thresholds or pure relative measures (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.

Results. Figure 9 shows the results for all three measures, with our L-SEPM and SCPM constructed from the CE and the SIPM constructed from the Current Population Survey. From 2009 to 2015, the L-SEPM and SCPM are similar in level and trend, while the SIPM is lower and also declines but at a slower rate. After 2015, all three decline on net with the major difference in the Pandemic period, when the SIPM fell and then rose again significantly in a pattern not exhibited in the L-SEPM and SCPM. Our L-SEPM shows the aforementioned increase in the poverty rate in the Pandemic. These differences aside, all three measures show a lower poverty

[43] Fisher-Johnson-Smeeding also used the CE to construct consumption inequality measures but computed but did not publish a consumption poverty measure.

rate in 2022 than in 2009.

To explain the reasons for the differences, starting with the SIPM, Figure 10 shows how our L-SEPM and the SIPM poverty rates are affected by the main differences in the construction of the measures, by modifying our L-SEPM in a sequence designed to move it closer to the income poverty measure. Dropping our treatment of subtracting capped housing flows from the threshold and dropping our deduction of housing expenses from resources–moving our threshold closer to that of the SIPM and our resource measure closer to income–(solid red line to dotted black line) raises the poverty rate because housing flows exceed expenses, and does by an increasing amount over time, raising the poverty rate by a little over one percentage point in 2009 but a little over two points in 2022. This moves the L-SEPM ever farther from the SIPM. But then also using the three Census housing expenditure thresholds instead of our L-SEPM consumption threshold (dotted black to dashed grey) lowers the rate of poverty because our 25th percentile consumption threshold is greater than the expenditure thresholds [44]. Our threshold also grew particularly rapidly in 2021 and 2022 because of increases in housing flows in those years, and this is not reflected in the expenditure threshold. This explains some of why our L-SEPM did not decline as fast as the SIPM in the 2020-2021 period. Putting in-kind transfers into resources instead of subtracting capped in-kind transfers from the threshold (dashed grey to dotted green) has little effect, consistent with our results for these transfers in our analyses already reported. The remaining gaps between our poverty rate and that of the SIPM constructed from the Current Population Survey are still in the 2009-2015 period and the 2019-2021 period. While, as noted earlier, we cannot separate how much of the differences are a result of differences in true income and expenditure and how much is a result of differences in measurement error in the two variables, the differences in the Pandemic period follow a pattern consistent with the higher level of transfers in 2021 and a decline in transfers in 2022 which were not fully reflected in

[44]There is an effect in 2009 even though our 25th percentile choice was picked to approximate the Census expenditure threshold in 2009, but it is not exact and there are also three Census thresholds, not just one.

expenditures. [45]

We should note that the difference in expenditure and income poverty rates is also heavily influenced by where the threshold is set, as shown in Appendix Figures A3 and A4, which show the distribution of income and expenditure as well as where poverty thresholds are located for year 2010, where the SIPM is most different from our L-SEPM adjusted to be closer to the income measure. Expenditure is heavily concentrated just above and below the threshold and therefore very sensitive to where it is drawn, and the differences vary by housing type. At current thresholds, there is slightly more mass of expenditure below the threshold than income, as shown in Figure 10. But a lower threshold would make income poverty greater than expenditure poverty and a slightly higher threshold would make expenditure poverty much greater than income poverty.

Figure 11 similarly shows how our L-SEPM and the SCPM poverty rates are affected by the main differences in the measures. Putting uncapped housing flows into resources instead of deducting capped housing flows from the threshold (red line to dotted grey line) results in a reduction in our poverty rate, fluctuating slightly above and slightly below one percentage point (and eliminates the increase in the poverty rate in 2020, as noted previously). As we have emphasized, the L-SEPM treats the excess housing flows as unavailable to purchase the other goods in the MB. Adding uncapped inkind transfers to resources instead of deducting capped amounts from the threshold (dotted grey line to dashed blue line) has only a small additional impact on reducing the poverty rate. But deducting the non-consumption items (those that are treated as investment and saving) from expenditure (dashed blue line to solid black line) raises the poverty rate almost as much as using uncapped housing flows and inkind transfers reduces it, leaving the SCPM poverty rate at the level slightly below the L-SEPM as already shown in Figure 9.

[45] Meyer-Han-Sullivan 2024 have a discussion of the Pandemic period, showing that saving rose during the Pandemic but transfers increased, lowering income poverty rates but not consumption poverty.

Figure 12 shows the three poverty measures when absolute thresholds are used and when the thresholds are set for all three in 2009 to generate the same poverty rate in that year.[46] All three show fairly similar patterns, with little change in the poverty rate from 2009 to 2014 and then a monotonic decline thereafter except for the rise of the SIPM in 2022 (again, the result of a decline in transfers in that year which was not reflected in a decline in expenditures or consumption). The generally slower growth of the poverty rate or the faster decline is a reflection of changes over time in real thresholds in our prior figures, and the differences with the SIPM and the two CE measures was, as we have noted, partly a result of the use of different thresholds. However, the similarity in the three measures again disguises offsetting differences between them, with the housing treatment in the SIPM and differences in income and expenditures having opposite effects on the poverty rate relative to the L-SEPM and with the treatment of housing flows and of investment expenditures in the SCPM having opposite effects on the poverty rate relative to the L-SEPM.

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 or saving 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 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

[46]The C-CPI-U price index is used.

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 a measure of resource poverty. The exclusion of expenditures on saving and investment from consumption is the best example of the difference, for those expenditures do constitute resources which could be spent instead on purchasing the goods in the basic needs bundle. The presence of durables and in-kind transfers also present difficulties for consumption poverty measures because treating durable flows and in-kind transfers as equivalent to private nondurable consumption, and thereby treating household well-being as unrelated to the fraction of consumption coming from illiquid durables and in-kind transfers, is a weakness.

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, which we argue they are for a significant fraction of the disadvantaged population. Focusing on liquid expenditure also permits a clear treatment of durables and in-kind transfers and their illiquidity, especially when the basic needs in the threshold are defined as a specific set of goods consumption, by allowing an adjustment to be made to the poverty threshold instead to resources. A focus on expenditure also makes possible a direct examination of the effects of government transfers on poverty by considering how expenditure is affected by transfers. 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

both of these limitations for future work.

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 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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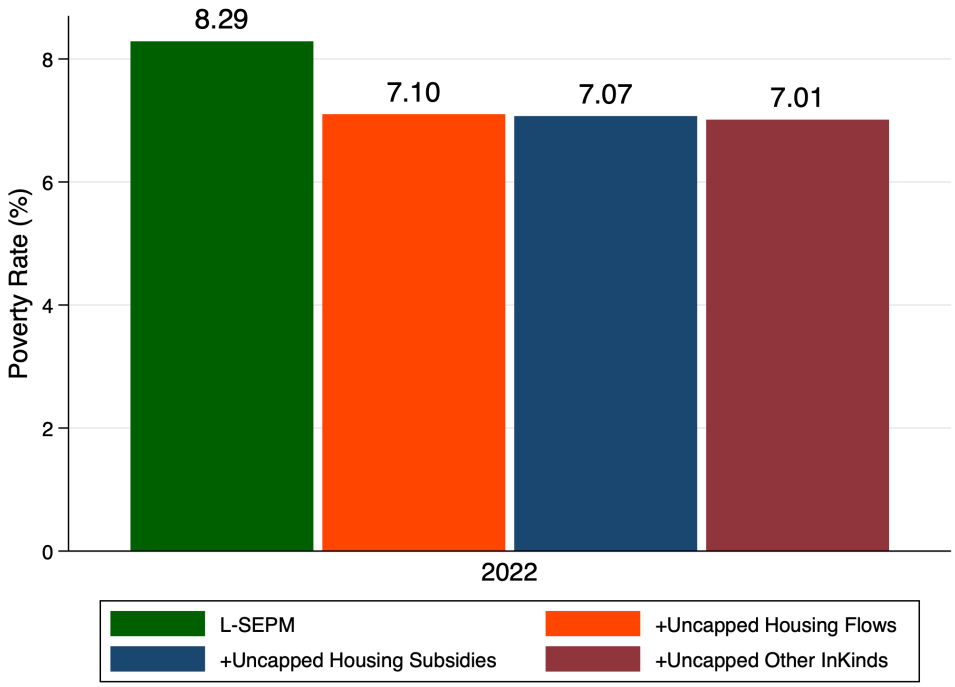
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Table 1: Mean L-SEPM Thresholds and Resources
for the Bottom Quintile of Total Expenditure, 2022

	All	By Housing Type		
		Owner w/ Mrtg	Owner w/o Mrtg	Renter
Total Threshold	$28,433	$28,043	$27,808	$29,003
Liquid-Adjusted Threshold	$20,951	$16,739	$16,979	$24,980
Total Resources	$22,834	$24,742	$21,473	$23,430
Less non-SNAP inkinds (CE expenditure)	$21,698	$24,505	$21,276	$21,362
Less SNAP & housing exp (Liquid resources)	$18,887	$16,026	$18,445	$19,896
Liquidity Adjustments to the Threshold (Non-zeros only)				
Capped housing flows	$7,292	$7,894	$7,168	.
% Housing flows > S	75.6%	78.7%	74.6%	.
Full −capped housing flows	$6,705	$6,748	$6,692	.
Capped housing subsidy	$6,485	.	.	. $6,485
% Housing subsidy > S	23.0%	.	.	23.0%
Full −capped housing subsidy	$168	.	.	$168
Capped food subsidy	$3,067	$2,397	$2,367	$3,425
% Food subsidy > F	10.4%	12.1%	5.6%	12.0%
Full −capped food subsidy	$159	$167	$109	$177
Capped energy subsidy	$394	$298	$398	$405
% Energy subsidy > U	0%	0%	0%	0%
Full −capped energy subsidy	$0	$0	$0	$0
Liquidity Adjustments to the Threshold (Including zeros)				
Capped housing flows	$3,752	$7,937	$7,370	.
% Housing flows > S	37.8%	78.6%	74.6%	.
Full −capped housing flows	$3,350	$6,741	$6,686	.
Capped housing subsidy	$780	.	.	$1,559
% Housing subsidy > S	2.8%	.	.	5.5%
Full −capped housing subsidy	$20	.	.	$40
Capped food subsidy	$1,234	$708	$634	$1,817
% Food subsidy > F	4.2%	3.6%	1.5%	6.4%
Full −capped food subsidy	$64	$49	$29	$94
Capped energy subsidy	$16	$9	$9	$23
% Energy subsidy > U	0%	0%	0%	0%
Full −capped energy subsidy	$0	$0	$0	$0
Sample Size	5,500	599	2,128	2,773

Note: The table presents the mean thresholds and resources for the bottom quintile of total resources, excluding in-kind transfers. The thresholds are adjusted for a family size of two adults and two children. 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. S, F, and U represent the shelter, food, and utility portions of the thresholds, respectively. All dollar values are expressed in 2014 real dollars.

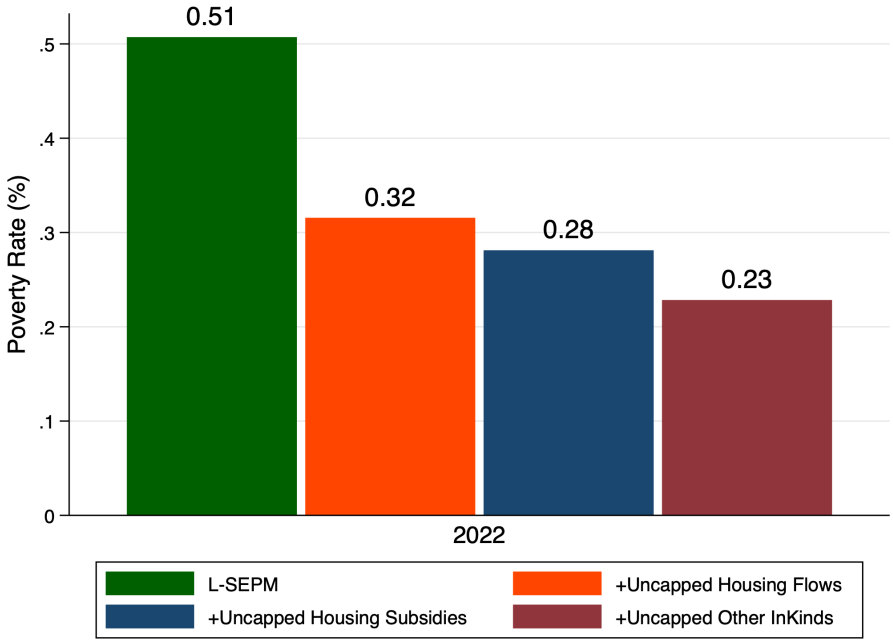
Figure 1: L-SEPM Poverty Rates, 2022



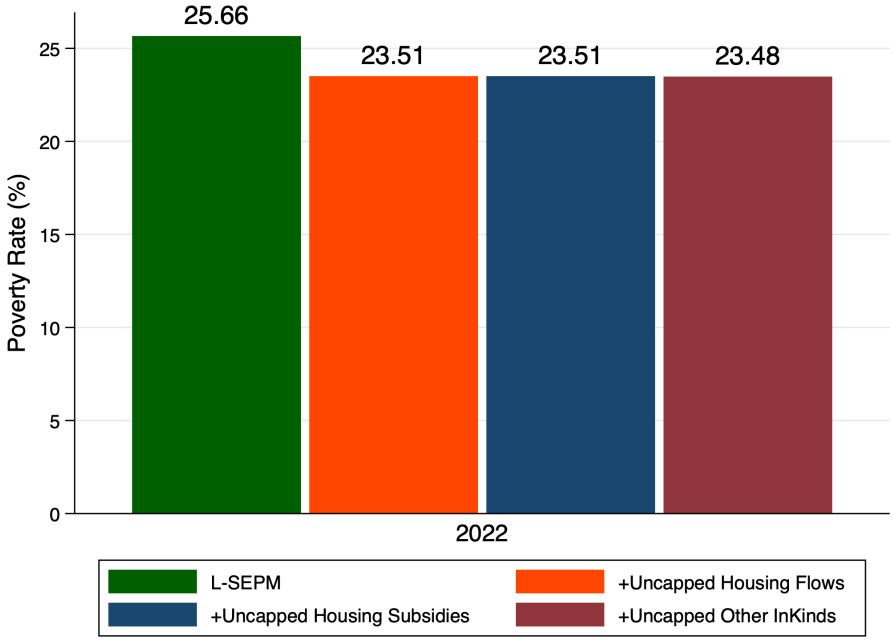
Note: The graph shows the trends of L-SEPM poverty rates and the effect of adding uncapped housing flows and all three uncapped flows (housing flows, housing subsidies, and other in-kind benefits) to the resources instead of subtracting the capped values of each from the thresholds.

Figure 2: Deep and Near L-SEPM Poverty Rates, 2022

(a) Deep Poverty Rates

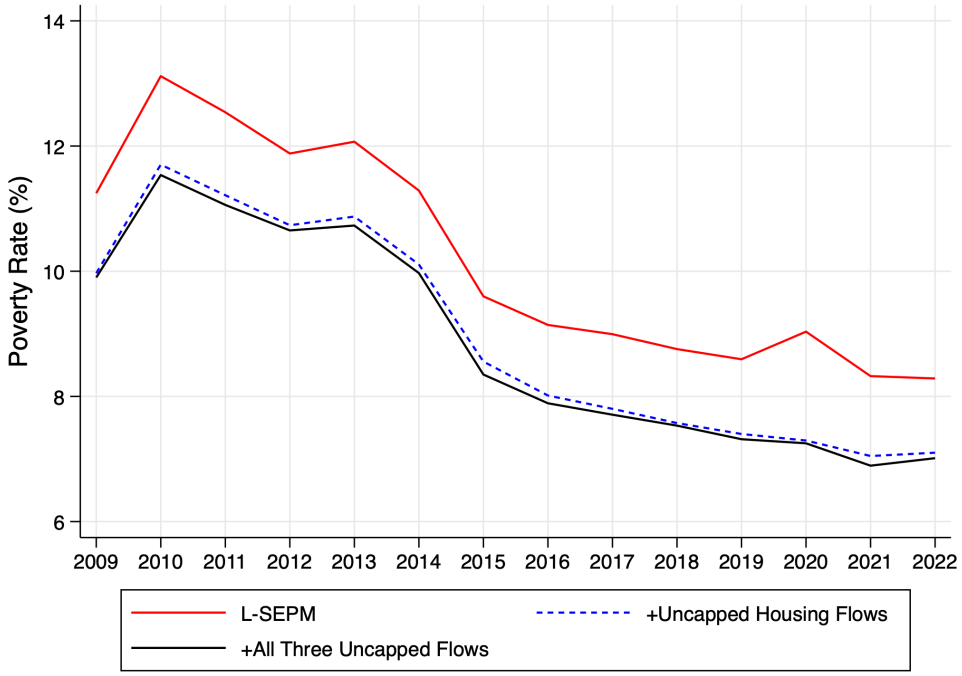


(b) Near Poverty Rates



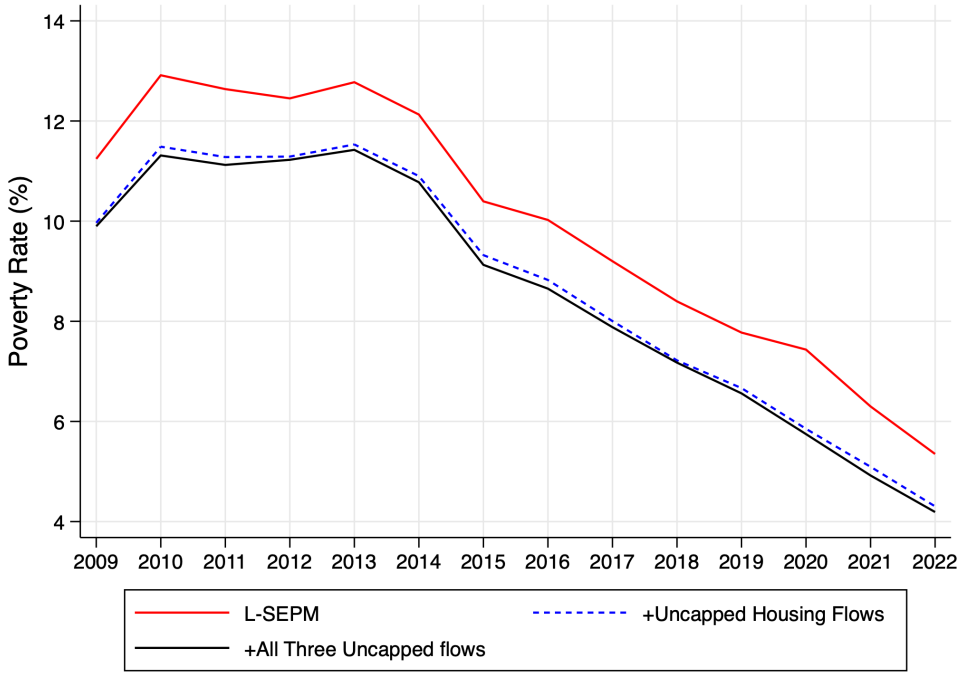
Note: The graph shows the trends of L-SEPM poverty rates and the effect of adding uncapped housing flows and all three uncapped flows (housing flows, housing subsidies, and other in-kind benefits) to the resources instead of subtracting the capped values of each from the thresholds.

Figure 3: L-SEPM Poverty Rates, 2009–2022



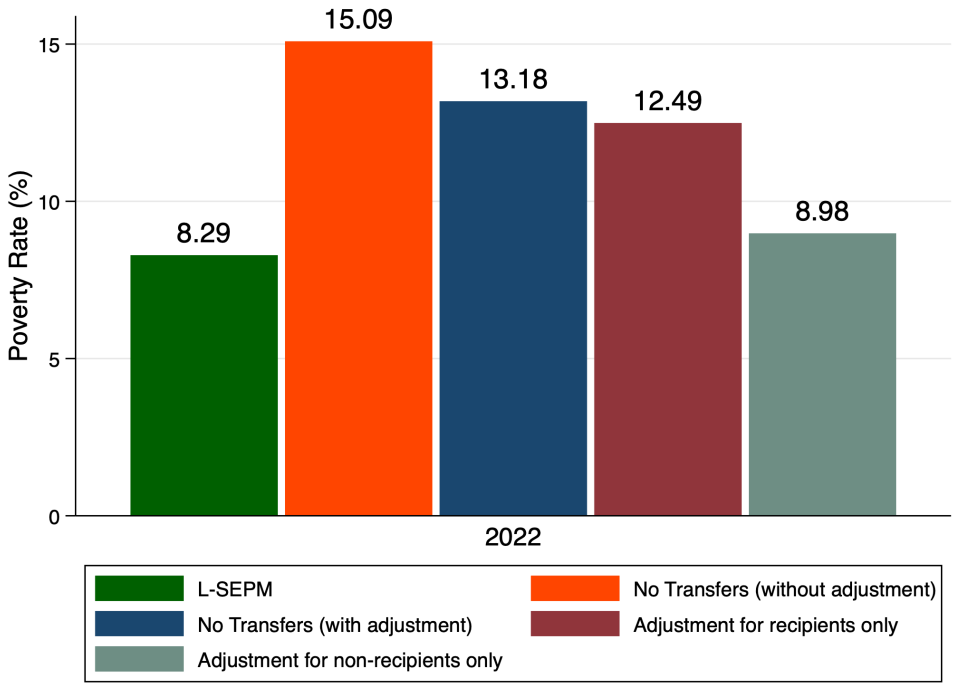
Note: The graph shows the trends of L-SEPM poverty rates and the effect of adding uncapped housing flows and all three uncapped flows (housing flows, housing subsidies, and other in-kind benefits) to the resources instead of subtracting the capped values of each from the thresholds.

Figure 4: Absolute Poverty Rates, 2009–2022



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

Figure 5: Effect of Transfers, 2022



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 6: Effect of Transfers, 2009–2022

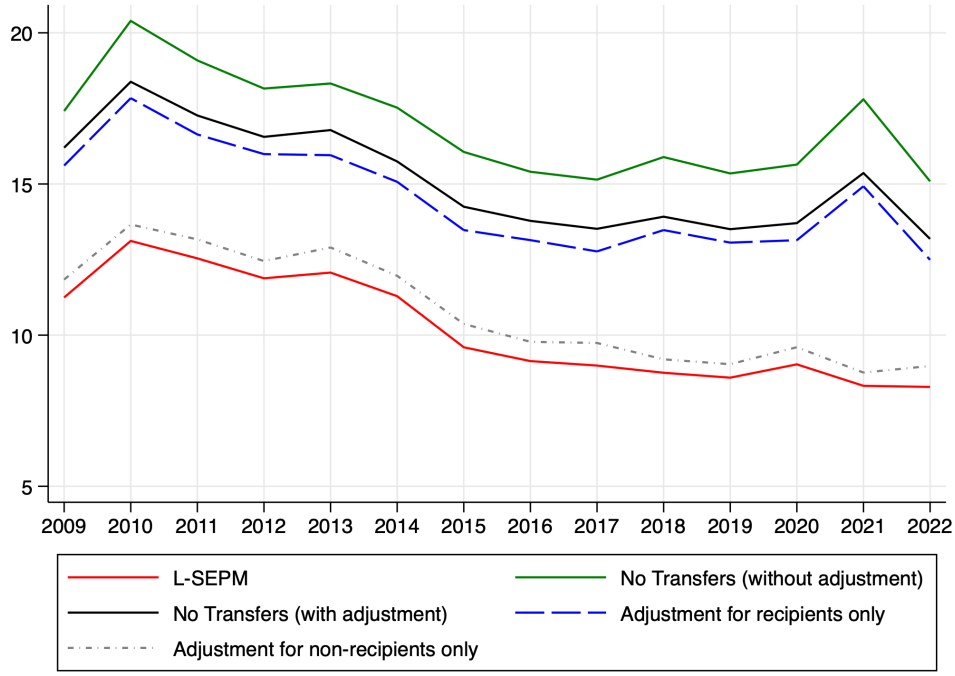


Figure 7: L-SEPM Poverty Rates Including Transportation, 2022

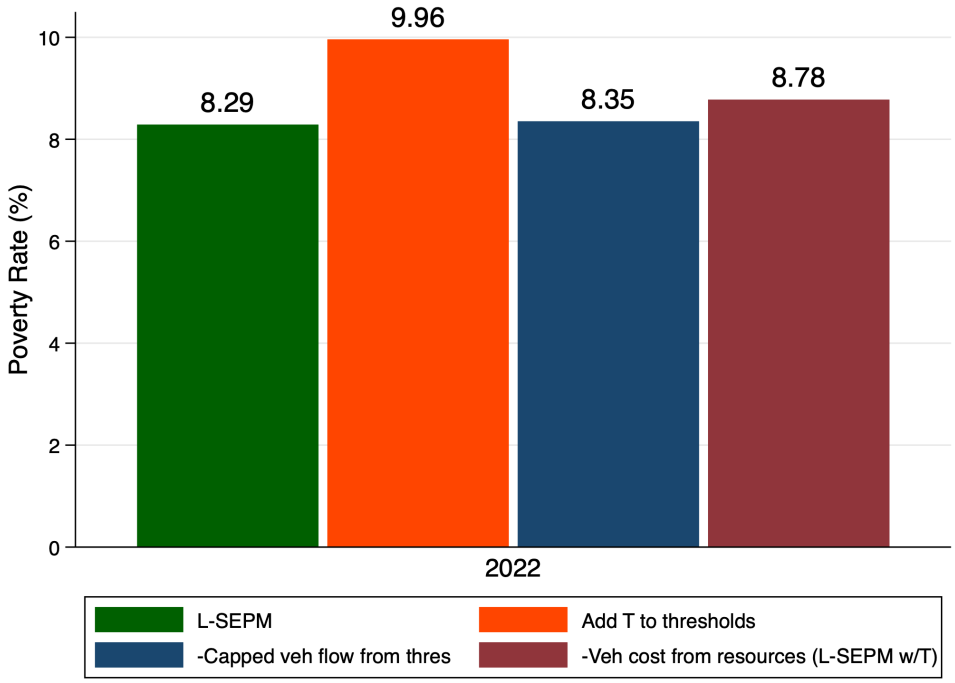


Figure 8: L-SEPM Poverty Rates Including Transportation, 2009–2022

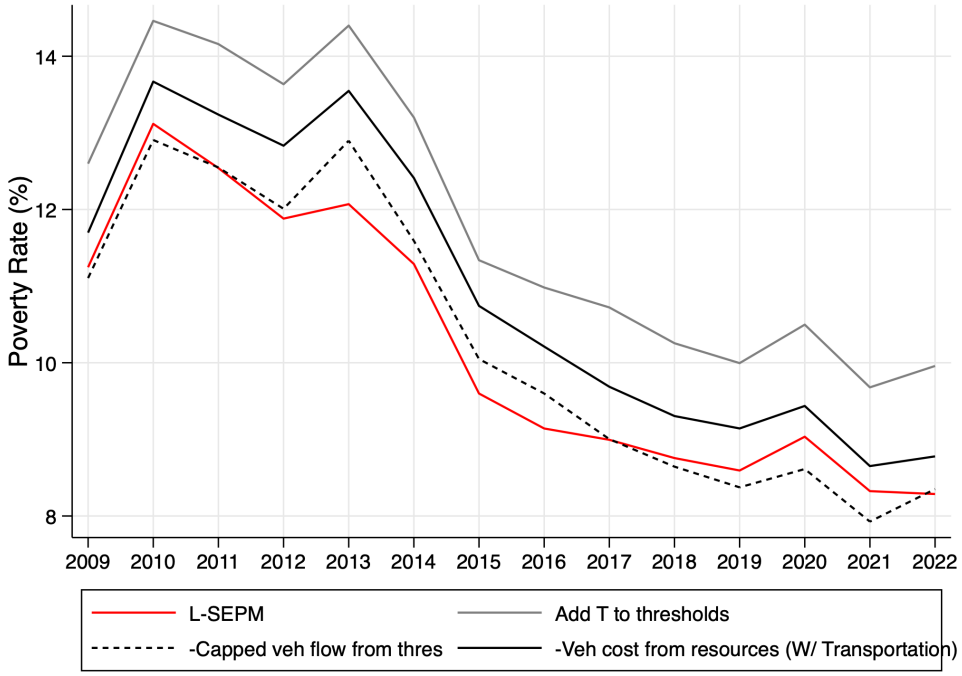


Figure 9: L-SEPM, SIPM, and SCPM

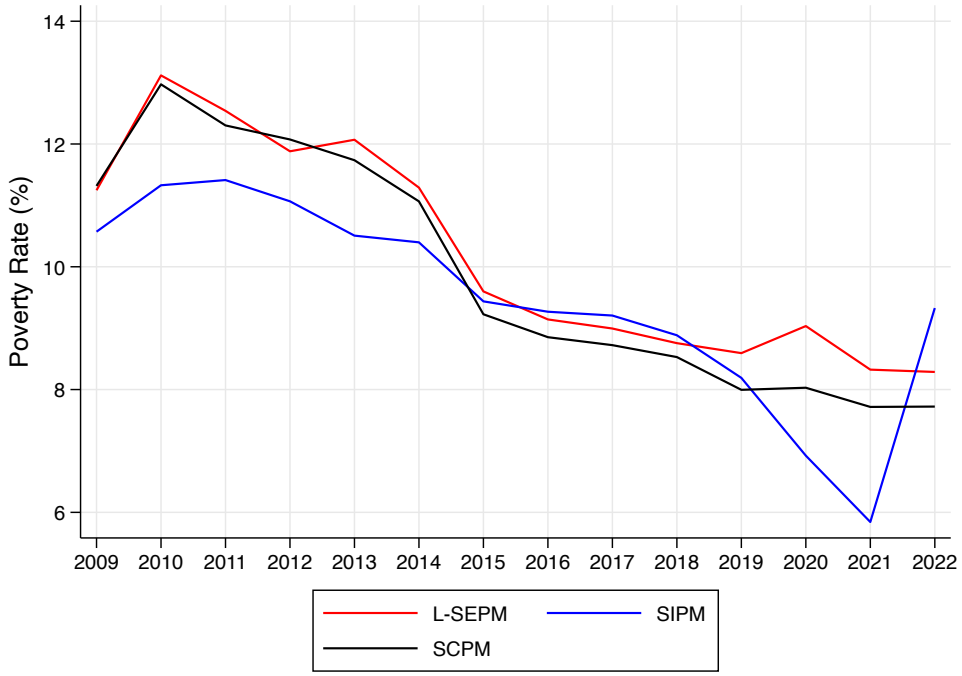


Figure 10: L-SEPM and SIPM

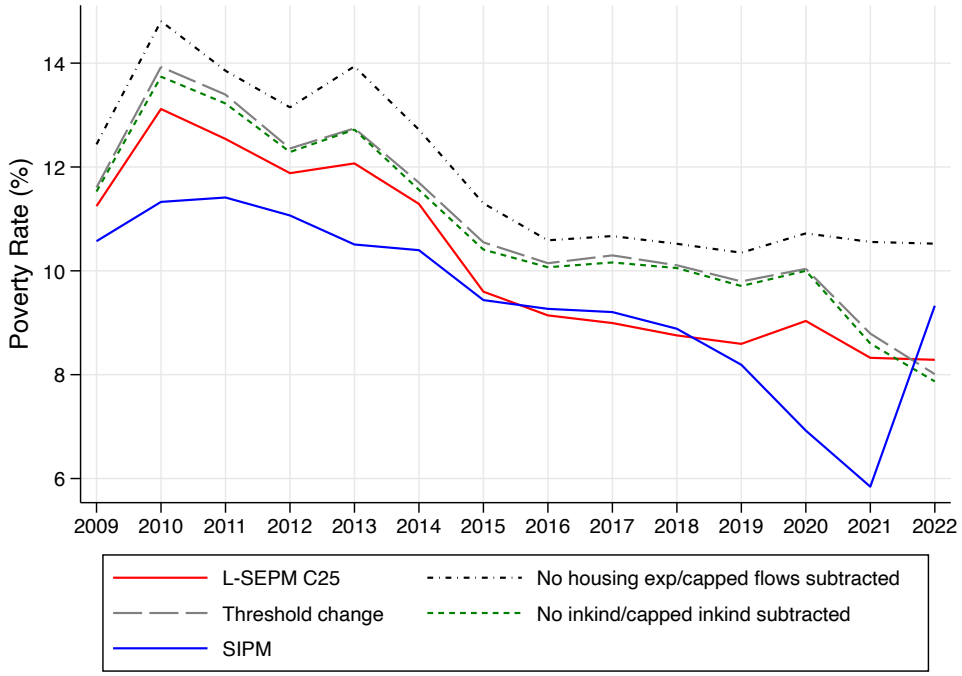


Figure 11: L-SEPM and SCPM

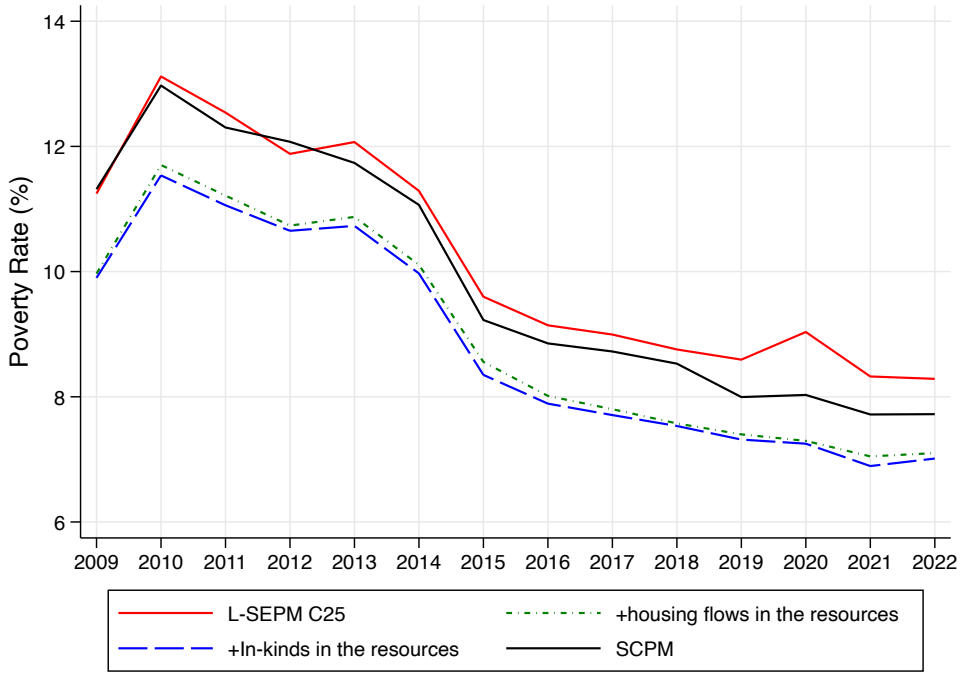
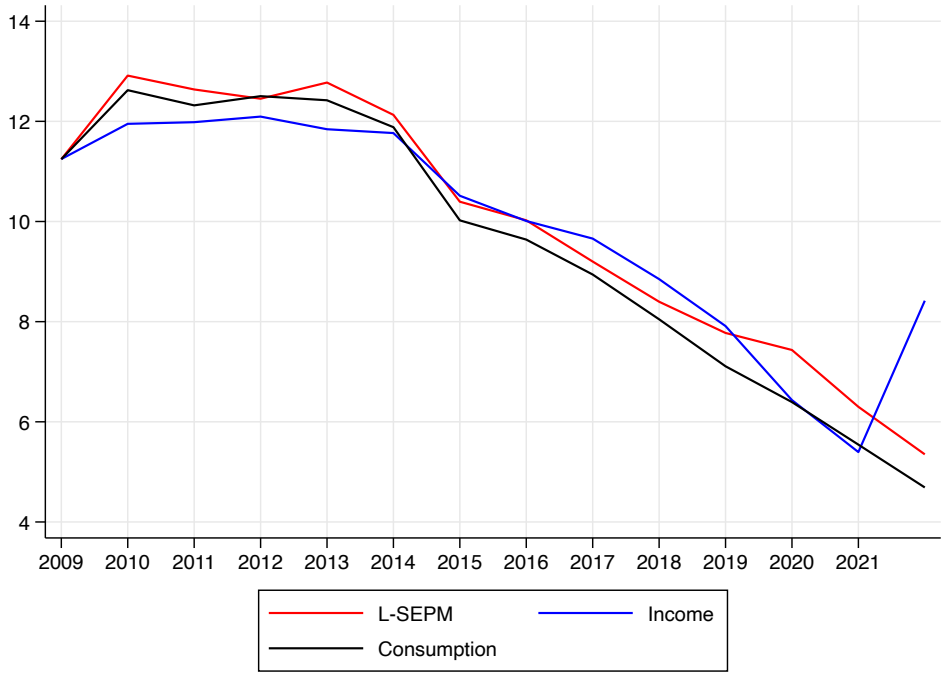


Figure 12: Absolute Poverty Rates by Measure



Note: Base: L-SEPM 2009 level (11.2%)

A Appendix: Adjustments for MOOP, Childcare and Work Expenses

Section III-B shows how the income-based SIPM and L-SEPM differ over time. Some readers will note that our SIPM differs from the SPM published by the Census Bureau in that they make several adjustments to resources when computing their SPM that we do not make. Namely, the Census Bureau makes four deductions from after-tax incomes to compute its SPM: MOOP, work-expenses, child care, and child support paid. In this section we show the impact of those deductions for our LSEPM and SIPM.[47] [48]

Although these adjustments are reasonable, we do not make these adjustments in the figures in the text in order to simplify our comparisons. We can make similar adjustments in the Census CPS (for SIPM) and our CE data (for LSEPM), but the components of these adjustments are reported and imputed in different ways in the CPS and CE and the resulting adjustments can differ. That is, these adjustment amounts, themselves, potentially could cause the CE and CPS poverty measures to differ.

Table A1 shows a comparison of the adjustments using CE data and CPS data from the Census SPM Research Files for 2009 and 2022. The table shows distributions from the bottom

[47] 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).

[48] 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).

quintile of income for CPS and for the bottom quartile of gross expenditure for the CE. In 2009, the MOOP distribution is lower for the CE data than for CPS, but MOOP is higher for CE in 2022 than for CPS. Capped work expenses plus child care are generally higher in the CE data than in CPS. Even though the sum of the two adjustments can be smaller for the CE in some years, the impact on poverty is determined by the shape of the resource distributions near the threshold, as mentioned in the text. A similar sized adjustment can pull more households into expenditure poverty because the expenditure distribution is thicker just above the threshold than the income distribution.

Figure A1 shows the impacts on poverty trends of deducting first MOOP and then work-expenses plus child care. The solid blue line is the base SIPM from the text. If we were to deduct MOOP from resources, poverty rises to the dotted blue line. Then after deducting capped work expense plus childcare, poverty rises to the dashed blue line. Ignoring the small deduction for child support paid, the dashed blue line corresponds to the published Census SPM. The two adjustments increase SIPM by 2 to 4 percentage points. The time trends with and without adjustment are broadly similar, although the adjustment amounts are smaller beginning in 2019.

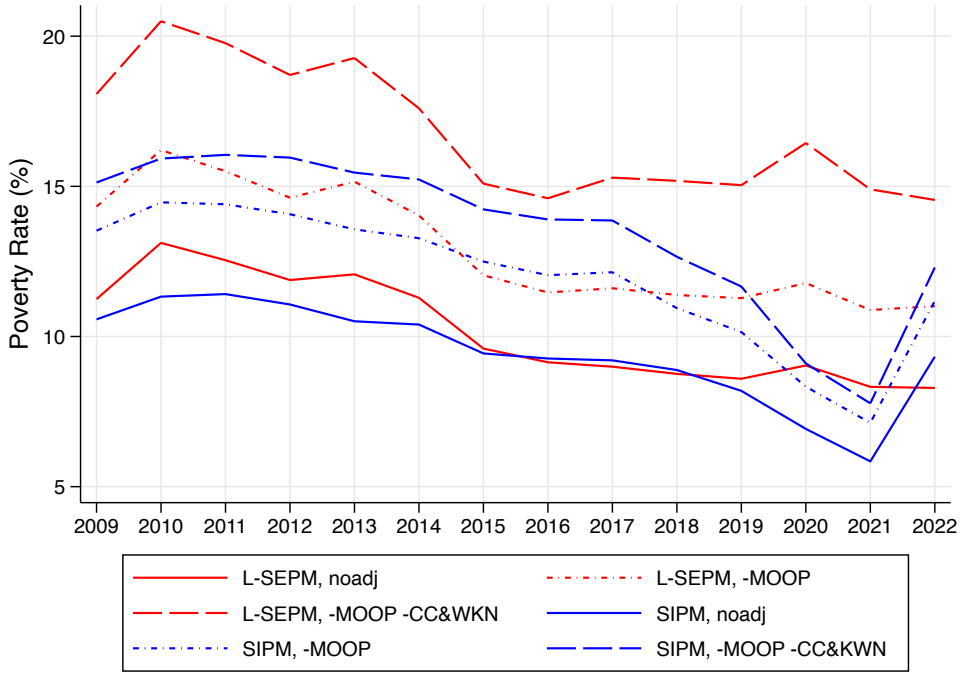
For our LSEPM, the adjustment results in larger increases in poverty rates than for the SIPM. The dashed red line shows LSEPM after deducting both MOOP and capped work-expense plus child care. The two adjustments increase LSEPM by 6 to 7 percentage points. Although the size of the adjustment varies a bit over time, the time trends in LSEPM are broadly similar with and without the adjustments. We conclude that the general trends in each measure were not significantly altered by the adjustments.

Table A1: MOOP and Work Expense Comparison

	2009		2022	
	CPS (Census)	CE	CPS (Census)	CE
MOOP				
Mean	$1,886	$1,232	$1,559	$1,552
p25	$0	$0	$0	$0
p50	$371	$132	$331	$1076
p75	$2,178	$1,862	$1,771	$2,406
p90	$5,034	$3,865	$3,976	$3,976
Work Expense & Child Care				
Mean	$569	$675	$430	$887
p25	$0	$0	$0	$0
p50	$0	$0	$0	$0
p75	$1,289	$1,050	$994	$1,242
p90	$1,596	$2077	$1,335	$2,576

Note: Census CPS (ASEC) columns are based on bottom quintile of after tax income plus SNAP. CE columns are based on bottom quintile of gross expenditure. All figures are in 2014$

Figure A1: Effect of Adjustments on Poverty Rates, 2009–2022



B Data Appendix

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. Survey year calendar dating. CE interviews ask about the prior 3 months. Because the first quarter interview asks primarily about spending from the end of the prior year, we construct a calendar year by combining the second through fourth quarters and the first quarter of the next year. Each quarter is treated as an independent observation, consistent with BLS methods, and annualized (multiplied by four).

b . 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.

c . Weights. For consumer unit level data we apply the final consumer unit weight 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.

d . CPI. We apply a geographical adjustment for cost of living based on fair market rent data using the method described in Fitzgerald and Moffitt (2022). The chained CPI-R-U is used when a price index is needed for anchoring the threshold, and in the computation of rolling five year averages for the FCSU.

e . We include the CE imputed values in the data.

II. Poverty Thresholds

a. Census Supplementary Poverty Measure (SPM). The Census Bureau uses a quasi-relative measure for the original SPM thresholds based on the mean of

consumer units outlays at for those in the 30-36th percentile range of spending on food, clothing, shelter and utilities (FCSU) plus a little more (20% more) to cover other necessities. The Census Bureau SPM method compares this to a measure of adjusted resources, deducting taxes, child care, MOOP, work expenses, and child support payments. The SPM thresholds are computed separately by housing status, with a different threshold for home-owners with a mortgage, home-owners without a mortgage, and renters. The SPM threshold naturally adjusts over time owing to changes in the nominal cost of the components of the threshold. The threshold is computed as a five year rolling average where prior four years are adjusted to that year's dollars and averaged. See Shrider and Creamer (2023).

b. Consumption threshold. We construct a flow-based measure of FCSU for income and consumption poverty using housing 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 FCSU expenditure. We include estimates of in-kind aid in FCSU that are not explicitly included in spending (WIC, school breakfast and lunch, housing assistance, LIHEAP) in the appropriate category of FCSU. This threshold is used for SIPM and 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.

c . 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 is considered an in-kind 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.

III . Resources

a. Expenditure. Gross expenditure is the aggregated outlays for the current quarter, multiplied by four to annualize it. 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.

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 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 measures for the SIPM measure are based on 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 LSEPM, 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) and vehicles service flows in place of their expenditures. Thus consumption is the sum of expenditures on food, alcohol, clothing, transportation (with vehicle service flow), 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. (2023) 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 LSEPM. (See transportation below.) Another difference is that we do not exclude MOOP from consumption, in order to make it more comparable to our LSEPM.

   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 used rent paid in the last quarter last month's rent times three. 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. When 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 Moffit (2022) data appendix for further explanation. 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 Fox et al. (2015).

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.

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 et al. (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 (2023) 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, 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

$$1.15FCSU + Tnw - capped(REV) - cappedhousing - capped\ in - kind.$$

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

$$E_i - H_i - \ max[Tw,\ VC\ for\ owners].$$

Table A2: Liquid Assets And Credit Card Balance

	Under age 65		Age 65 or older	
Expenditure	Liquid assets	CC balance	Liquid assets	CC balance
0-50% threshold				
Mean	$716	$296	$5,227	$158
p50	$0	$0	$0	$0
p75	$1	$0	$48	$0
p90	$932	$0	$1,027	$0
50-100%				
Mean	$1,678	$367	$6,192	$359
p50	$0	$0	$0	$0
p75	$101	$0	$523	$0
p90	$1,550	$414	$5,134	$188
100-150%				
Mean	$3,176	$1,012	$12,069	$751
p50	$0	$0	$13	$0
p75	$780	$0	$2,190	$0
p90	$4,459	$2,329	$19,495	$1,047
150% or above				
Mean	$19,231	$2,629	$38,094	$1,530
p50	$1,516	$0	$2,866	$0
p75	$10,145	$2,002	$23,544	$373
p90	$41,027	$8,010	$118,219	$4,005
Frequency	61,060	66,854	19,806	22,943

Source: Consumer Expenditure Survey (2009-2022).

Note: This table presents household liquid assets and credit card balances categorized by the poverty status and age of the household head. All dollar values are expressed in 2014 real dollars, adjusted using the C-CPI-U. Expenditures include both liquid and illiquid expenditures as well as in-kind transfers.

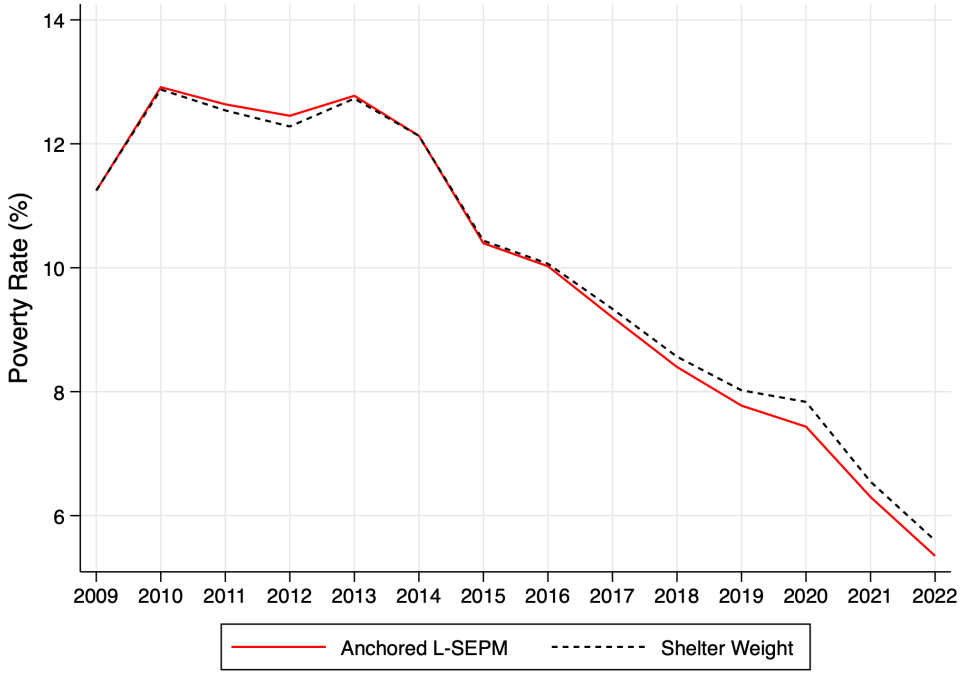
Table A3: Thresholds and Resources, 2009 and 2022

Year	2009	2022
Total thresholds	$23,871	$27,052
2A2C thresholds (threshold families)	$26,681	$29,225
Food	$7,137	$7,870
Clothing	$1,016	$790
Shelter	$9,957	$11,785
Utility	$4,068	$3,825
Little More	$4,502	$4,954
Liquidity-adjusted thresholds	$17,395	$19,019
p20	$10,651	$11,294
p40	$14,629	$15,369
p60	$17,654	$18,879
p80	$22,616	$25,113
Total resources	$55,575	$63,724
Less non-SNAP inkinds (CE expenditure)	$55,165	$63,129
Less SNAP and housing expenses (Liquid resources)	$44,828	$52,471
p20	$21,706	$25,388
p40	$31,094	$36,846
p60	$42,339	$49,755
p80	$60,232	$70,540
Housing Flows	$12,219	$15,258
Inkind Transfers	$635	$1,001
Sample size	28,069	19,152

Source: Consumer Expenditure Survey.

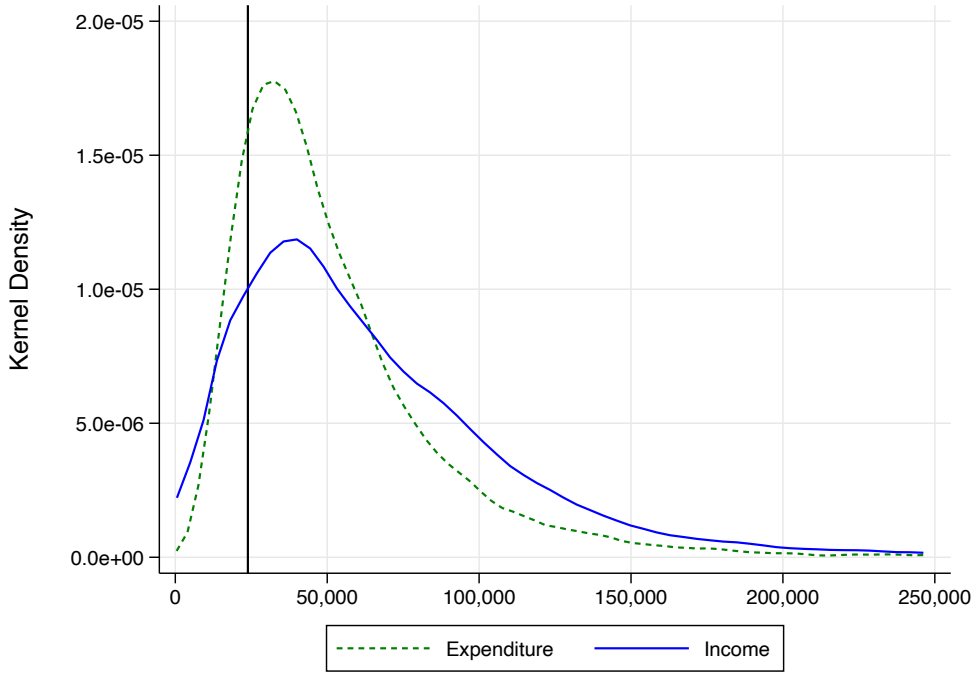
Note: All variables are means over the full population unless noted otherwise. Total Thresholds represent the average threshold values for all families, adjusted for family size and geographic variations. 2A2C thresholds show the average thresholds among the threshold families (22nd to 28th percentile distribution of the minimum bundle) 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.

Figure A2: Absolute Poverty Rates, 2009–2022
Shelter Weighted CPI



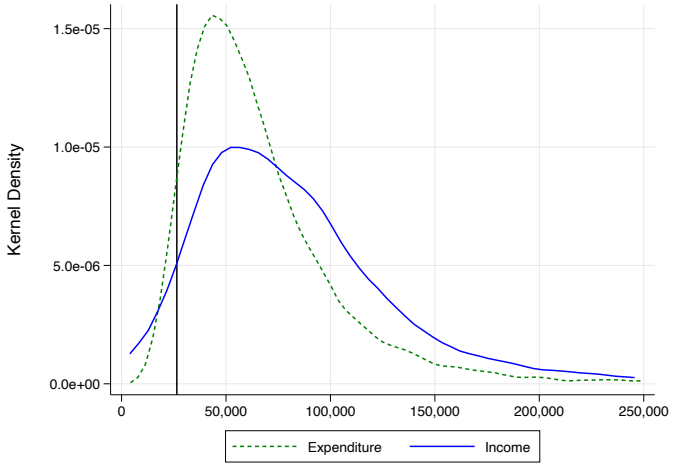
Note: Thresholds are anchored to 2009 L-SEPM and adjusted over time using the C-CPI-U.

Figure A3: Distribution of CE Expenditure and CPS Income, 2010

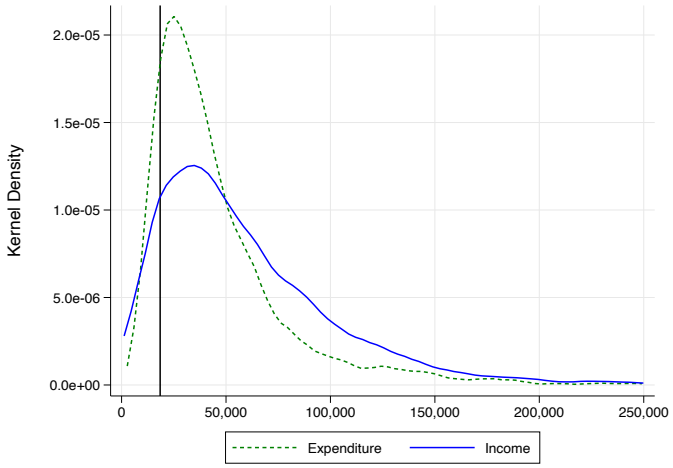


Note: Both expenditure and income include in-kind transfers and are not adjusted for MOOP, childcare, or work expenses. The vertical line denotes the average SPM threshold.

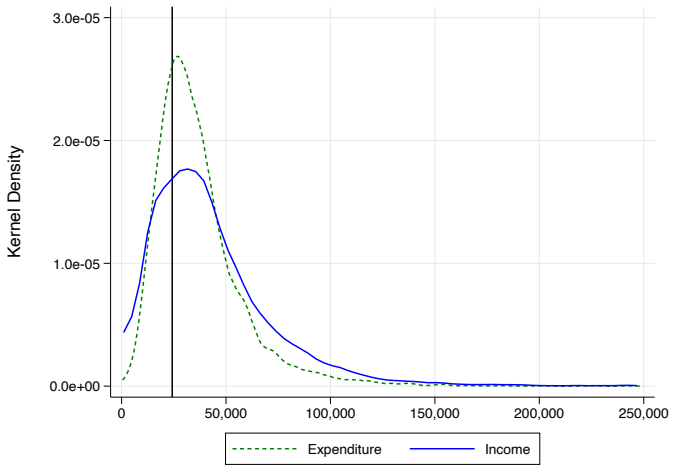
Figure A4: Distribution of CE Expenditure and CPS Income by Housing Type, 2010



(a) Homeowners with Mortgage



(b) Homeowners without Mortgage



(c) Renters

Note: Both expenditure and income include in-kind transfers and are not adjusted for MOOP, childcare, or work expenses. The vertical line denotes the average SPM threshold.