Trends in Poverty with an Anchored Supplemental Poverty Measure

Christopher Wimer
Liana Fox
Irv Garfinkel
Neeraj Kaushal
Jane Waldfogel

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Introduction

Poverty measures set a poverty line or threshold and then evaluate resources against that threshold. The official poverty measure is flawed on both counts: it uses thresholds that are outdated and are not adjusted appropriately for the needs of different types of individuals and households; and it uses an incomplete measure of resources which fails to take into account the full range of income and expenses that individuals and households have. Because of these (and other) failings, statistics using the official poverty measure do not provide an accurate picture of poverty or the role of government policies in combating poverty.[1]

To address these well-known limitations, the Census Bureau recently implemented a supplemental poverty measure (SPM) which applies an improved set of thresholds and a more comprehensive measure of resources. The Census Bureau has released SPM statistics for 2010-2012 (Short, 2011, 2012, 2013). From these reports, we know that using the SPM results in a higher overall threshold, more income, but also more expenses. The net effect is a slightly higher overall poverty rate – 16.0 percent with SPM vs. 15.1 percent with OPM in 2012. These reports also illustrate the crucial anti-poverty role played by programs not counted under the OPM (programs such as SNAP/Food Stamps and EITC).

In recent work, we have produced SPM-like estimates for the period 1967-2012, using historical data on incomes from the 1968-2013 Annual Social and Economic Supplement to the Current Population Survey (March CPS) and historical data on expenditures from the 1961, 1972/73, and 1980-2012Consumer Expenditure Survey (CEX) (Fox et al., 2013).[2] These estimates confirm that overall poverty is slightly higher with SPM than OPM but that government policies have played a more important role in reducing poverty than would be suggested by OPM, and particularly in recent years.

One possible limitation of our historical SPM estimates is that they rely on annual calculations of thresholds even in years where we have incomplete CEX data. The Census SPM methodology uses 5 years of CEX data to calculate moving average thresholds for each year. But in our historical estimates, thresholds prior to 1972, and between 1972/73 and 1980 must be imputed using data from just 2 years of CEX (1961 and 1972/1973, and 1972/73 and 1980 respectively); thresholds in the early 1980s also rely on less than the full 5 years of data used in the later period. A second possible limitation is that the SPM methodology applies the same metric -- the 30-36th percentile of expenditures on food, clothing, shelter, and utilities, plus 20% more to

[1] See Bernstein, 2001; Blank and Greenberg, 2008; Citro and Michael, 1995; Hutto et al., 2011.

[2] As described in Fox et al. (2013), we produced our SPM series using a methodology similar to that used by the Census in producing their SPM estimates, but with adjustments for differences in available historical data. We set poverty thresholds based on consumer expenditures on food, clothing, shelter, and utilities (FCSU) between the 30th-36th percentiles of expenditures on FCSU, plus an additional 20 percent to account for additional necessary expenditures. The thresholds are further adjusted depending on whether the household makes a mortgage or rent payment, or if the household owns its home free and clear of a mortgage. These thresholds are based on 5-year rolling averages of the CEX data when available (and on averages from fewer years when data for the previous five years are not available). Thresholds are then applied to the March CPS sample and equivalized for family size and composition. Rather than comparing the threshold to only pre-tax income as is done in the OPM, the threshold is compared to a much broader set of resources, including post-tax income and near-cash transfers (such as SNAP/Food Stamps), and then subtracting work, child care, and medical out-of-pocket expenditures. This process is then repeated historically.

cover other essentials – to define the poverty line over time. But that basket of goods might not mean the same thing historically as it does today (given the changing composition of individual and household purchases over time).

For these reasons, in this report we apply an alternative poverty measure which differs from the SPM in only one respect. Instead of having a threshold that is re-calculated over time, we use today's threshold and carry it back historically by adjusting it for inflation using the CPI-U-RS. Because this alternative measure is anchored with today's SPM threshold, we refer to as an anchored supplemental poverty measure or anchored SPM for short.

In addition to the reasons discussed above, another advantage of an anchored SPM (or any absolute poverty measure, for that matter) is that poverty trends resulting from such a measure can be explained by changes in income and net transfer payments (cash or in kind). Trends in poverty based on a relative measure (e.g. SPM poverty), on the other hand, could be due to over time changes in thresholds. Thus, an anchored SPM arguably provides a cleaner measure of how changes in income and net transfer payments have affected poverty historically.

Data and Methods

Poverty Unit

We define the "poverty unit," or those who are thought to share resources, as in the SPM. So, compared to the OPM definition, families are broadened to include unmarried partners (and their children/family members), unrelated children under age 15, and foster children under age 22 (when identifiable). All resources and non-discretionary expenses are pooled across members of the poverty unit to determine poverty status.

Anchored SPM Threshold

To set the anchored SPM threshold, we first set a threshold for 2012. Specifically, we follow the Census Bureau methodology and construct poverty thresholds using a five-year moving average of 2007-2012Consumer Expenditure Survey (CEX) data on out-of-pocket expenditures on food, clothing, shelter and utilities (FCSU) by consumer units with exactly two children (called the "reference unit"). All expenditures by consumer units with two children are adjusted by the three-parameter equivalence scale (described in the appendix; see also Betson and Michael, 1993) and then ranked into percentiles. The average FCSU for the 30-36th percentile of FCSU expenditures is then multiplied by 1.2 to account for additional basic needs. We then use equivalence scales to set thresholds for all family configurations.

We determine thresholds overall, and by housing status. The Census Bureau produces base thresholds for three housing status groups: owners with a mortgage; owners without a mortgage; and renters. The SU portion of the FCSU is estimated separately for each housing status group.

Our overall SPM threshold is simply the average SU for all consumer units in the 30-36th percentile of FCSU.[3]

Once we have established the thresholds for 2012, we then carry them back historically by adjusting them for inflation using the CPI-U-RS.[4]

Resources

The SPM takes into account a much fuller set of resources than the OPM, including near-cash and in-kind benefits, as well as tax credits[5]. We describe below how we calculate the value of these various types of resources.

SNAP/Food Stamps: Receipt of the Supplemental Nutrition Assistance Program (SNAP), formerly known as the Food Stamp Program, is routinely measured in the CPS beginning in 1980 (for calendar year 1979). The program, however, existed for all years included in our analysis (albeit on a very small scale in our earliest years). It grew rapidly over the 1970s as it was extended nationally, making it important to capture SNAP/Food Stamps benefits prior to 1979 in our historical SPM measure. We use a 2-step procedure to impute SNAP/Food Stamps for the earlier years: each household in the CPS is first predicted to receive or not receive SNAP/Food Stamps, followed by imputation of the benefit amount for those predicted to receive the program. The procedure for imputation is based on administrative data on SNAP/Food Stamps caseloads and benefit levels and is detailed in the technical appendix.

School Lunch Program: The National School Lunch Act of 1946 launched a federally assisted meal program that provides free or low-cost lunches to children in public and nonprofit private schools. Like SNAP/Food Stamps, however, it is only measured in the CPS starting in 1980 (for calendar year 1979). We impute the value of the School Lunch Program benefits using a procedure similar to SNAP/Food Stamps imputation. Details of our imputation approach are in the technical appendix.

Women Infants and Children (WIC): The WIC program, which provides coupons that can be used to purchase healthy food by low-income pregnant women and women with infants and toddlers, was established as a pilot program in 1972 and became permanent in 1974, with large expansions occurring in the 1970s. While the CPS does not provide data on the value of WIC,

[3] Note that an overall SPM threshold is not advised or published by OMB. In creating an overall SPM threshold, our objective is to facilitate a historical comparison of OPM with a single SPM. However, in estimating poverty rates, each poverty unit is assigned a housing status specific threshold—no family receives the overall threshold.

[4] The CPI-U-RS is the Census' preferred series for overall changes in inflation over time. Alternate estimates using the CPI-U (available upon request), which is the series used to update modern OPM poverty thresholds, show a less dramatic decline in poverty over time, indicating that poverty rates may be understated in the early part of the time period, essentially masking historical declines in poverty.

[5] For 2008 and 2009, SPM resources include federal stimulus and economic recovery payments made as part of the Economic Stimulus Act of 2008 and the American Recovery and Reinvestment Act of 2009. While both of these payments operated through the tax system, their value is not included in the federal tax liabilities including tax credits variable in the Current Population Survey. Similar historical stimulus programs are not are only included in earlier years if they affected federal tax liabilities (as they did in 2001 and the 1980s), but otherwise are excluded.

since 2001 it has included data on the number of WIC recipients per household. Therefore, a procedure was necessary to impute participation in WIC prior to 2001 and the value of WIC for all years. Details of our imputation approach can be found in the technical appendix.

Housing Assistance: Federal housing assistance programs have existed in the United States since at least the New Deal. Such programs typically take one of two forms: reduced-price rental in public housing buildings or vouchers that provide rental assistance to low-income families seeking housing in the rental market. In the CPS, questions asking about receipt of these two types of housing assistance exist back to 1976 (for calendar year 1975). This means housing assistance receipt for years prior to 1975 must be imputed. Unlike programs like SNAP/Food Stamps, we only need to impute receipt of assistance. To estimate the value of the assistance, we first estimate rental payments as 30 percent of household income, and subtract this from the shelter portion of the threshold. We then apply a small correction factor given that this valuation will tend to overestimate the value of housing assistance relative to Census procedures, which are able to utilize rich administrative data in the modern period. Further detail on both the imputation procedure and the benefit valuation are provided in the technical appendix.

Low Income Home Energy Assistance Program (LIHEAP): LIHEAP was first authorized in 1980 and funded in 1981. It is measured in the CPS starting in 1982 (for calendar year 1981). Thus, the entire history of the program is captured in the CPS, and no imputations were necessary for this program.

Taxes and Tax Credits: Like with SNAP/Food Stamps and the School Lunch Program, the Census' official tax model, and resultant after-tax income measures, do not exist in the CPS prior to 1980 (for calendar year 1979). The EITC, however, was enacted in 1975 (albeit in a much smaller form than it exists today). The Child Tax Credit provides additional benefits to families with children, and was created in 1997. And income and payroll taxes have obviously existed for much longer. Thus, it was necessary to develop after-tax income measures in years prior to 1980. We used the National Bureau of Economic Research's *Taxsim* model (Feenberg and Countts, 1993) to estimate these after-tax income variables.

Non-Discretionary Expenses

Aside from the payroll and income taxes paid that are generated from the tax model, the SPM also subtracts medical out-of-pocket expenses (MOOP) from income, as well as capped work and child care expenses. MOOP and child care expenses are directly asked about in the CPS only starting in 2010, meaning we must impute these expenses into the CPS for virtually the whole period. For consistency, we use data from the CEX to impute MOOP and child care expenses into the CPS for all years. Work expenses (e.g., commuting costs) are never directly observed in the CPS and are currently estimated based on the Survey of Income and Program Participation (SIPP). We estimate work expenses back in time to 1997 using an extended time series provided to us by the Census Bureau. For years prior to that, we used a CPI-U inflation-adjusted value of the 1997/98 median work expenditures. Further details on the imputation of medical, work, and child care expenses are provided in the technical appendix.

Results

Anchored SPM Threshold

Figure 1 shows the value of our anchored SPM poverty thresholds for 1967-2012 (in constant 2012 dollars), and how they compare to the OPM and SPM thresholds for the same years.[6] By definition, the anchored SPM and SPM are identical in 2012 (and both are higher that year than the OPM one), but it is evident that they diverge historically, with the anchored SPM threshold consistently higher in the past than the annually calculated SPM threshold (and OPM threshold).

Anchored SPM versus OPM Poverty Rates

Figure 2 presents historical poverty rates for the total population using the anchored SPM vs. OPM. While the OPM line displays the familiar pattern – with poverty at 14% in 1967 and 15% in 2012 – the anchored SPM line tells a very different story – with poverty falling from about 26% in 1967 to 16% today.

Figures 3-5 present anchored SPM vs. OPM poverty rates for three age groups: children; working-age adults; and the elderly. The overall trends for the total population are mirrored in the trend for the largest group, working-age adults (shown in Figure 4). But the story is different for children and the elderly.

As shown in Figure 3, child poverty is higher with the anchored SPM than the OPM for most of the period, but with a cross-over in the late 2000s, a period when important elements of the safety net not counted in OPM were expanded (as we discuss further below). For the elderly, in contrast, as shown in Figure 5, poverty is consistently higher with the anchored SPM than with the OPM, reflecting the fact that most resources reaching the elderly are counted in both measures but only the SPM subtracts medical expenses, a particularly important item for this group.

The Role of Government Programs

In this section, we make use of the anchored SPM to calculate a set of counterfactual estimates for what poverty rates would look like if we did not take taxes and government transfers into account.[7] We provide estimates for the total population and for children, since many of the transfer programs are particularly aimed at children.

We begin, in Figure 6, by showing poverty rates for the total population with and without taxes and government transfers. These government transfers include: food and nutrition programs (SNAP/Food Stamps, School Lunch, WIC); other means tested transfers (SSI, cash welfare (i.e.

[6] For illustrative purposes, the thresholds displayed in the figure are for two-adult two-child families. As mentioned earlier, Census and the BLS do not produce overall SPM thresholds, but only thresholds that vary by housing status. We present an overall threshold here so that we can compare the average SPM threshold to the OPM one. However, all SPM poverty rates are calculated using the housing status-relevant SPM thresholds, not the overall ones.

[7] It is important to note that these counterfactual estimates tell us in an accounting sense how much taking government transfers into account alters our estimates of poverty. However, because we do not model potential behavioral responses to the programs, these estimates cannot tell us what actual poverty rates would be in the absence of the programs.

TANF/AFDC), Housing Subsidies, LIHEAP); and social insurance programs (Social Security, Unemployment Insurance, Worker's Compensation, Veteran's Payments, and government pensions). Taxes include both taxes that reduce income (payroll taxes, federal and state income taxes) and tax programs that increase income (like the EITC and other tax credits). The bottom line in the figure shows what the anchored SPM poverty rate is taking all of these taxes and transfers into account, whereas the top line shows what poverty rates would be if taxes and transfers were not taken into account.

Figure 6 shows the substantial, and growing, effect of taxes and transfer payments on poverty rates. Using the pretax/pretransfer measure, we find that poverty would have actually increased slightly over the time period, from 27% to nearly 29%. But after accounting for taxes and transfers, poverty falls by approximately 40%, from 26% to 16%. The figure also shows the growing anti-poverty role of taxes and transfers in reducing poverty, from only about 1 percentage point in 1967 to nearly 13 percentage points in 2012.

Figure 7 presents similar estimates but for deep poverty (i.e. the share of the total population with incomes below 50% of the poverty line). This figure illustrates the important role transfers play in reducing rates of deep poverty, particularly during economic downturns. Deep poverty rates hover around 5% for most of the period (except in the first several years) but the counterfactual line shows that without transfers deep poverty rates would instead range from 15% to 20%.

Figures 8 and 9 present similar estimates but for poverty and deep poverty among children. Here the growing role of transfers, and particularly newly counted SPM transfers, is particularly striking. By 2012, estimates that did not count the resources from non-cash transfers and the tax system would find child poverty at 30% and deep child poverty at 17%, rather than 19% and 5%. Figure 12 indicates that all of the major types of transfer programs are playing a role in reducing child poverty – and that together they add up to reduce child poverty from 31% without transfers to 19% taking all transfers into account.

Finally, in Figures 10 and 11 we show how much of the anti-poverty role of transfers would be missed if we defined resources according to the OPM. Here we just look at the effect of transfers under the OPM with the (cash) transfers that it captures, and compare that to the effect of all taxes and transfers under the SPM. In the early period, the OPM overstates the role of transfers, as it takes into account cash transfers but not taxes paid, and those taxes paid outweigh the additional transfers that come in-kind that are included in the SPM. But over time this discrepancy reverses, such that in the modern period the OPM understates the role of transfers (which now are more likely to be delivered in-kind or through the tax system). In 2012, for instance, we find that the full tax and transfer system reduces overall poverty rates by 12.7 percentage points, as opposed to just 9 percentage points that one would see under the OPM.

This trend is even starker for children, which is shown in Figure 11. In 1967, the poverty rate would actually be *lower* if not for taxes and transfers, as the reductions in income from the tax system outweigh the broader set of transfers embedded in the SPM. But by 2012, the full tax and transfer system is reducing estimated poverty rates by 11 percentage points among children. If one had just looked at the role of cash transfers under the OPM, that figure would be only 3.2

percentage points. In other words, in 2012 the OPM misses over two-thirds of the role that taxes and transfers play in reducing child poverty rates.

Conclusion

Our estimates using the anchored SPM show that historical trends in poverty have been more favorable -- and that government programs have played a larger role -- than OPM estimates suggest. The OPM shows the overall poverty rates to be nearly the same in 1967 and 2011 – at 14% and 15% respectively. But our counterfactual estimates using the anchored SPM show that without taxes and other government programs, poverty would have been roughly flat at 27-29%, while with government benefits poverty has fallen from 26% to 16% -- a 40% reduction. Government programs today are cutting poverty nearly in half (from 29% to 16%) while in 1967 they only cut poverty by about a one percentage point.

Results are particularly striking for child poverty and deep child poverty. In 2012, government programs reduced both child poverty and deep child poverty by 11 percentage points. In 1967, by contrast government programs (through the tax system) actually increased child poverty rates, and reduced deep child poverty rates by only 4 percentage points. Estimates with the OPM would miss much of this poverty reduction, particularly in the modern period as after-tax and in-kind benefits have grown in importance.

It is important to note some issues not addressed in our work to date. The first is the problem of under-reporting of benefits in the March CPS; to the extent that benefits are under-reported, and such under-reporting has grown over time (Wheaton, 2008), this will lead us to under-estimate the role played by government policies, and more so over time (Meyer and Sullivan, 2012a, b; Wheaton, 2008). Second, the inclusion of MOOP in the SPM is controversial (see e.g., Korenman and Remler, 2012; Meyer and Sullivan, 2012). In future work, we would like to address the under-reporting problem and also to experiment with alternative ways to take medical expenses into account.

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Figure 1: Historical Poverty Threshold Comparison, Official vs SPM for 2A/2C Families (in 2012 CPI-U-RS$), 1967-2012

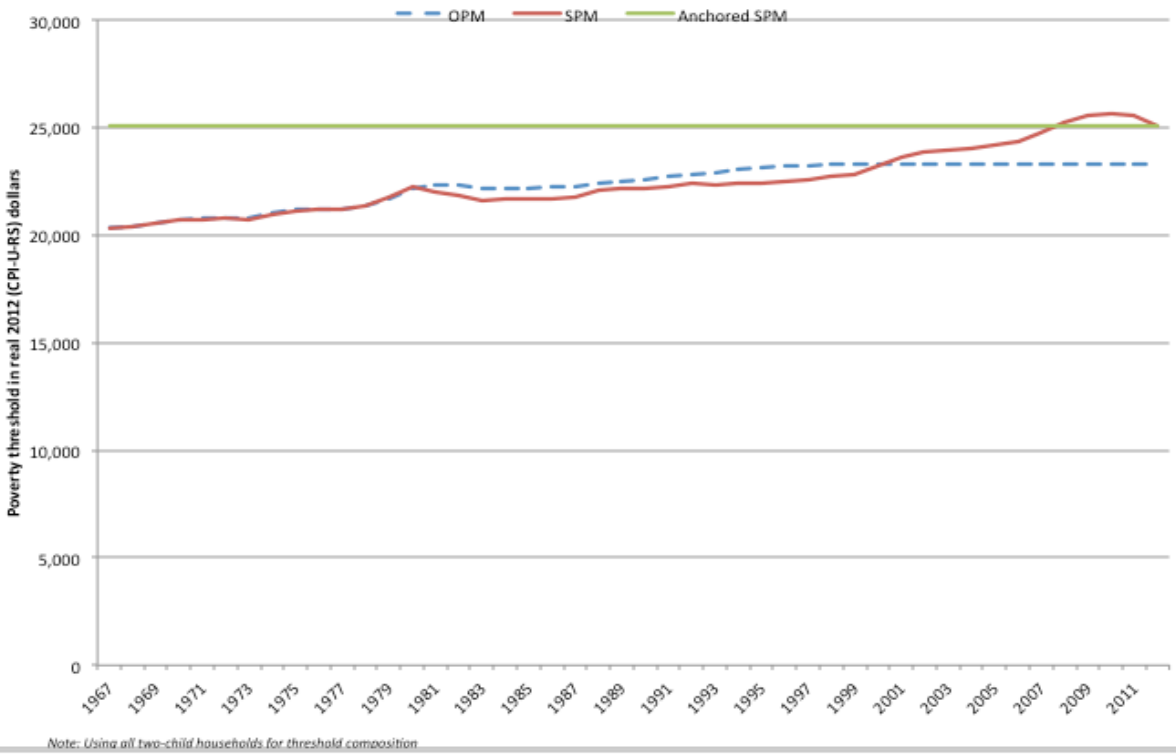
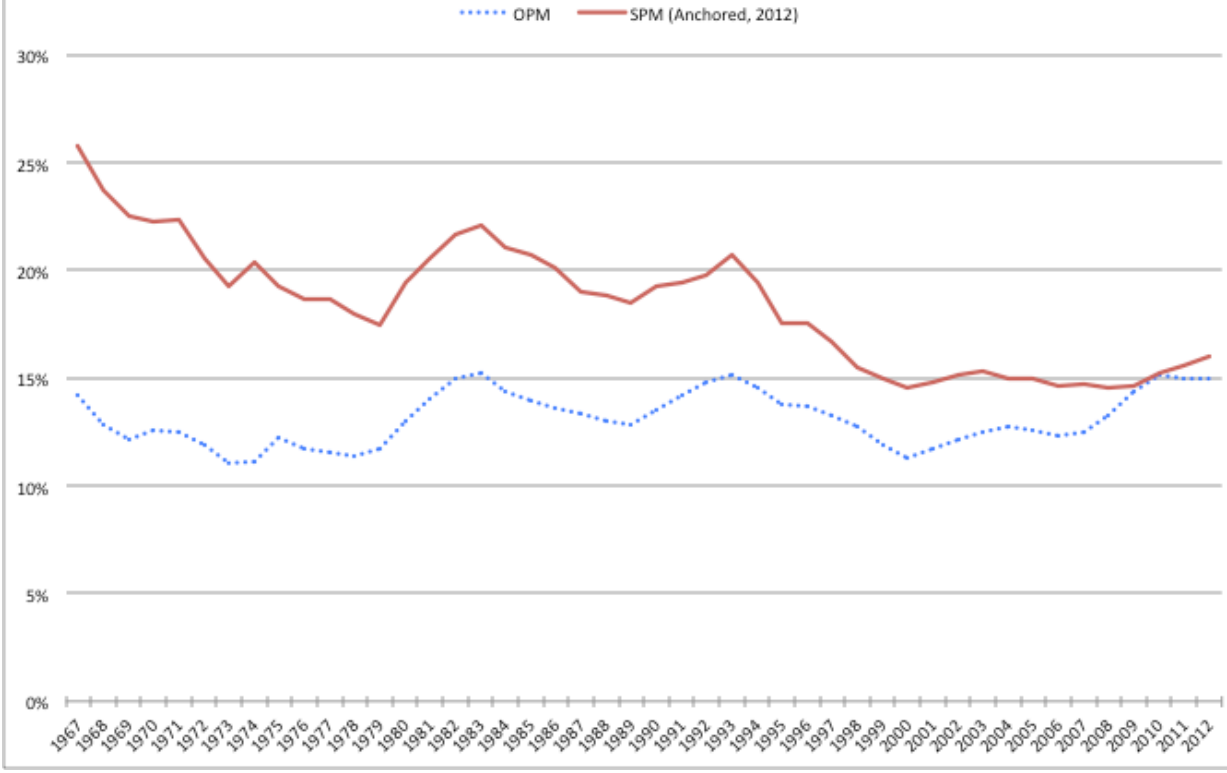


Figure 2: Official vs Supplemental Poverty Rates, 1967-2012



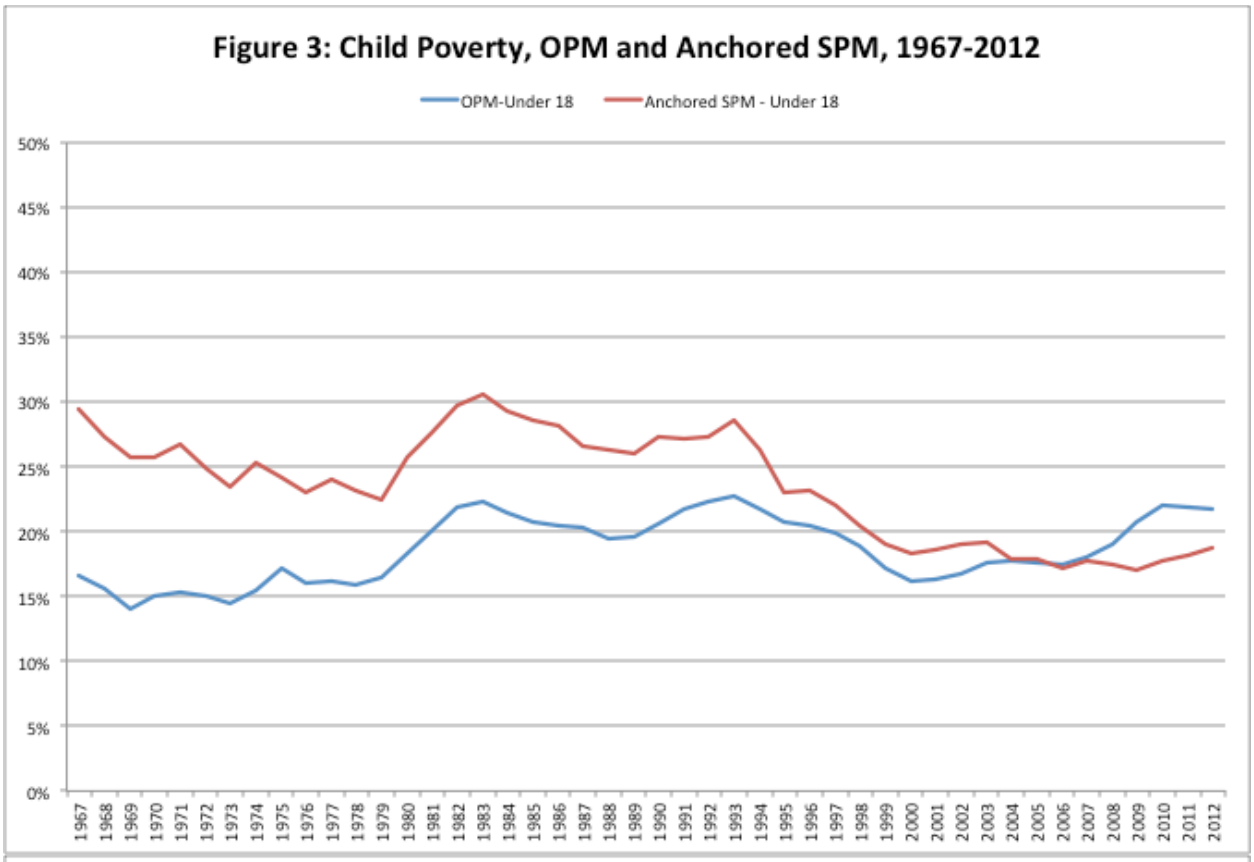


Figure 3: Child Poverty, OPM and Anchored SPM, 1967-2012
OPM-Under 18
Anchored SPM - Under 18
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

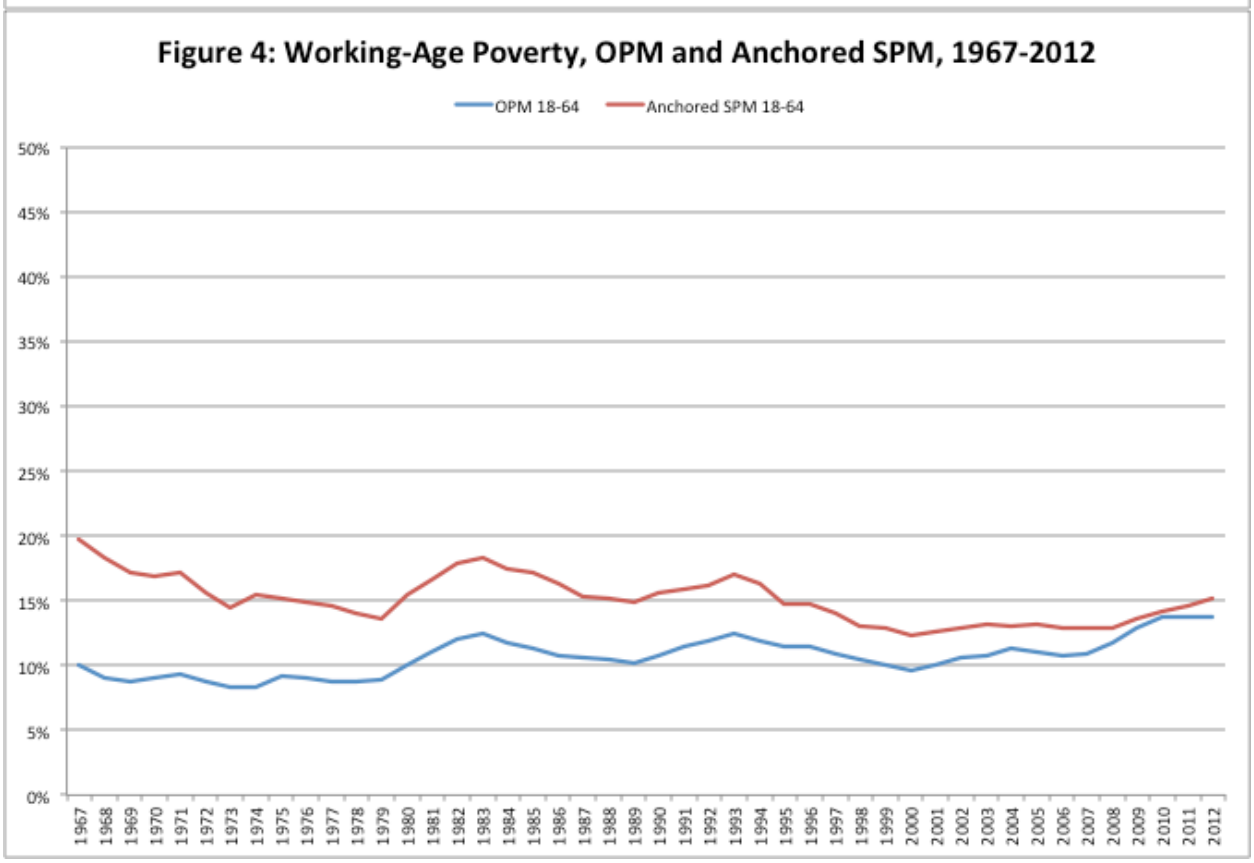


Figure 4: Working-Age Poverty, OPM and Anchored SPM, 1967-2012
OPM 18-64
Anchored SPM 18-64
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

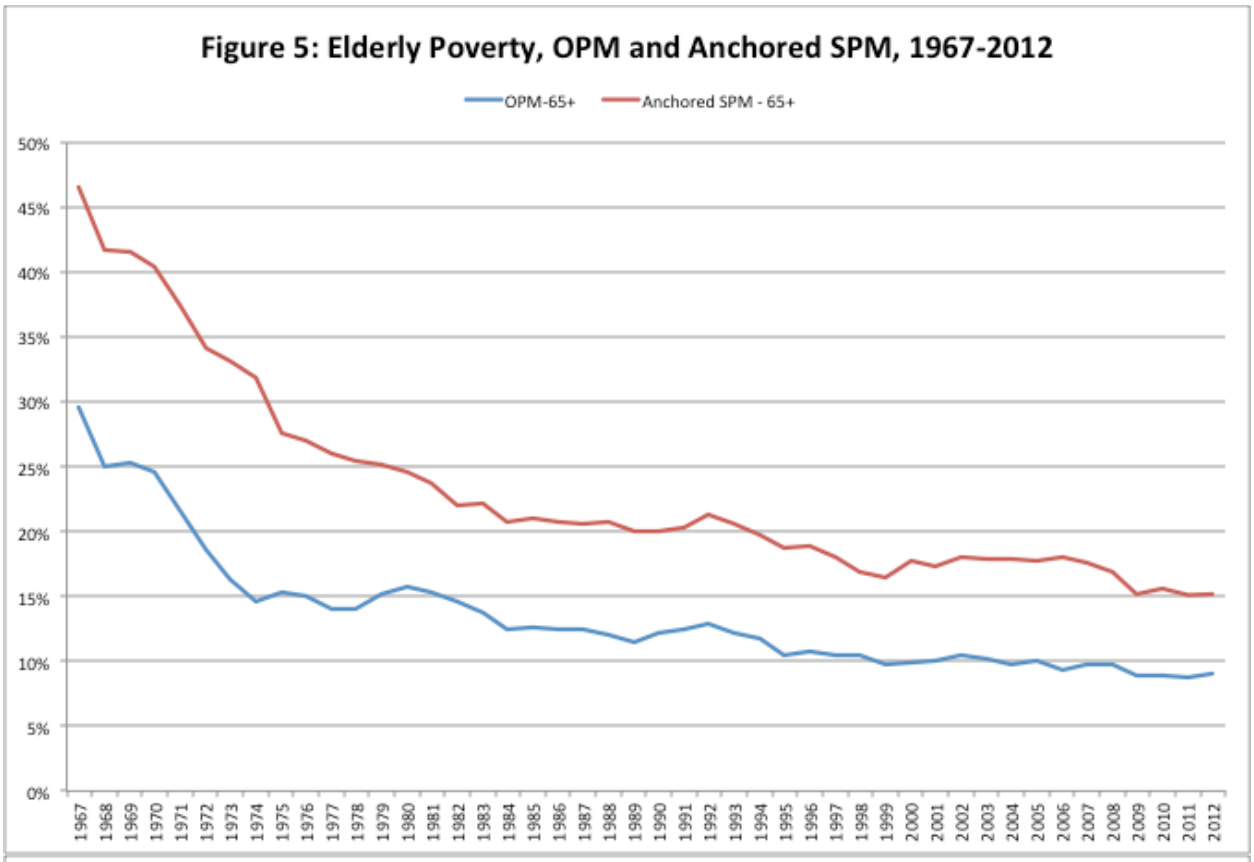


Figure 5: Elderly Poverty, OPM and Anchored SPM, 1967-2012
OPM-65+
Anchored SPM - 65+
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

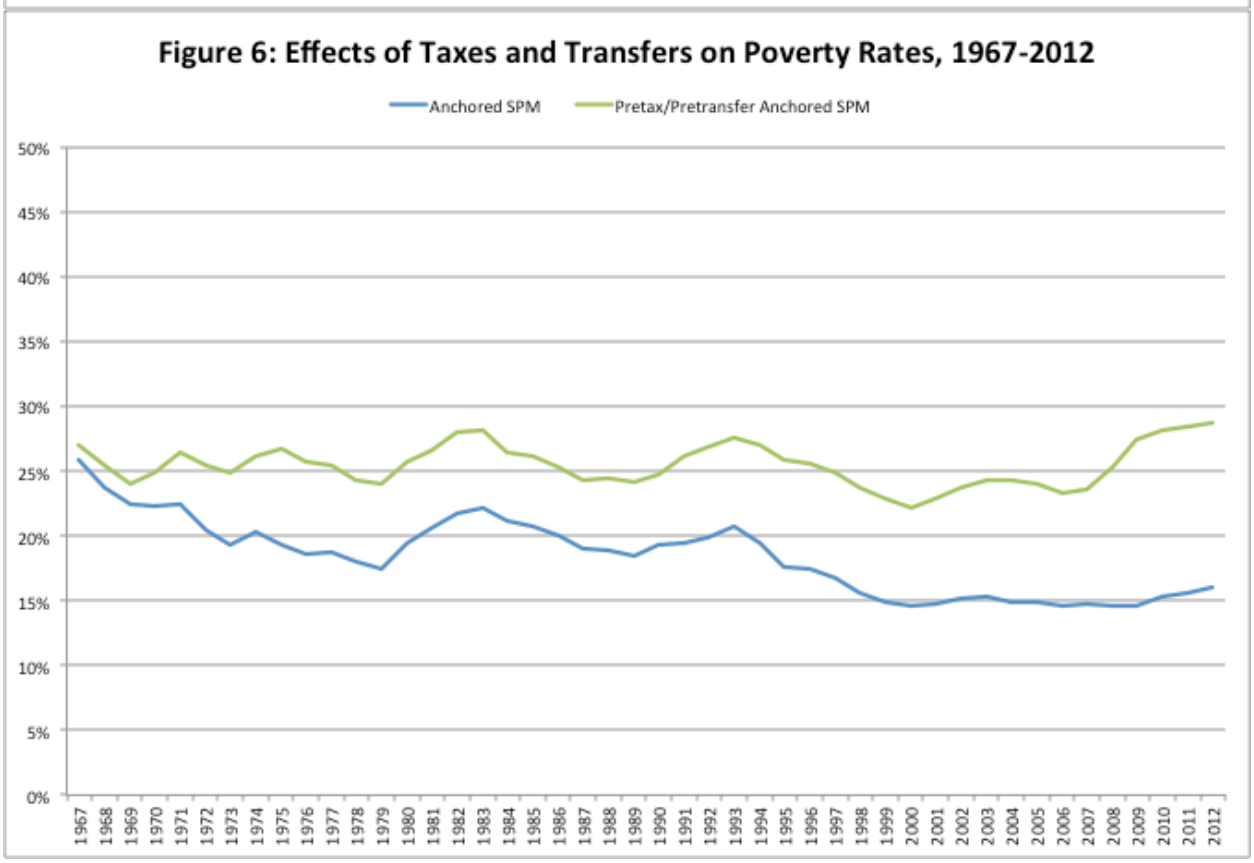


Figure 6: Effects of Taxes and Transfers on Poverty Rates, 1967-2012
Anchored SPM
Pretax/Pretransfer Anchored SPM
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012

Figure 7: Effect of Taxes and Transfers on Deep Poverty Rates, 1967-2012

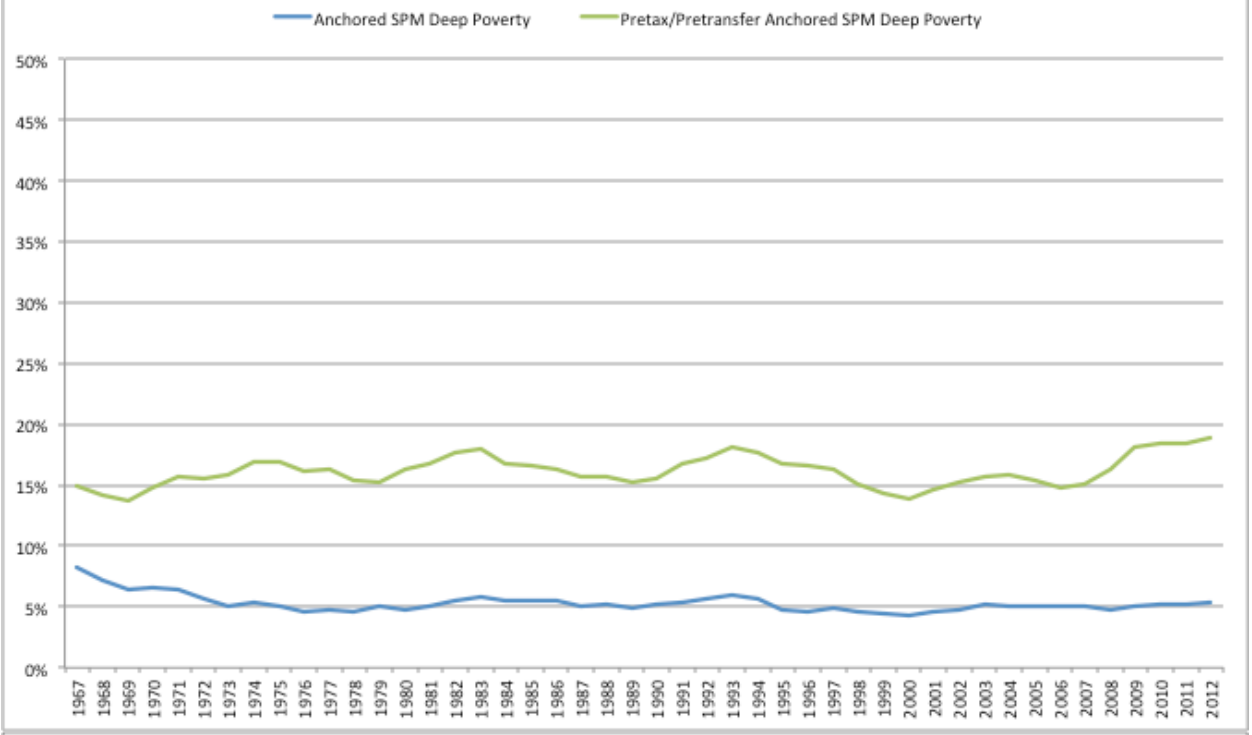
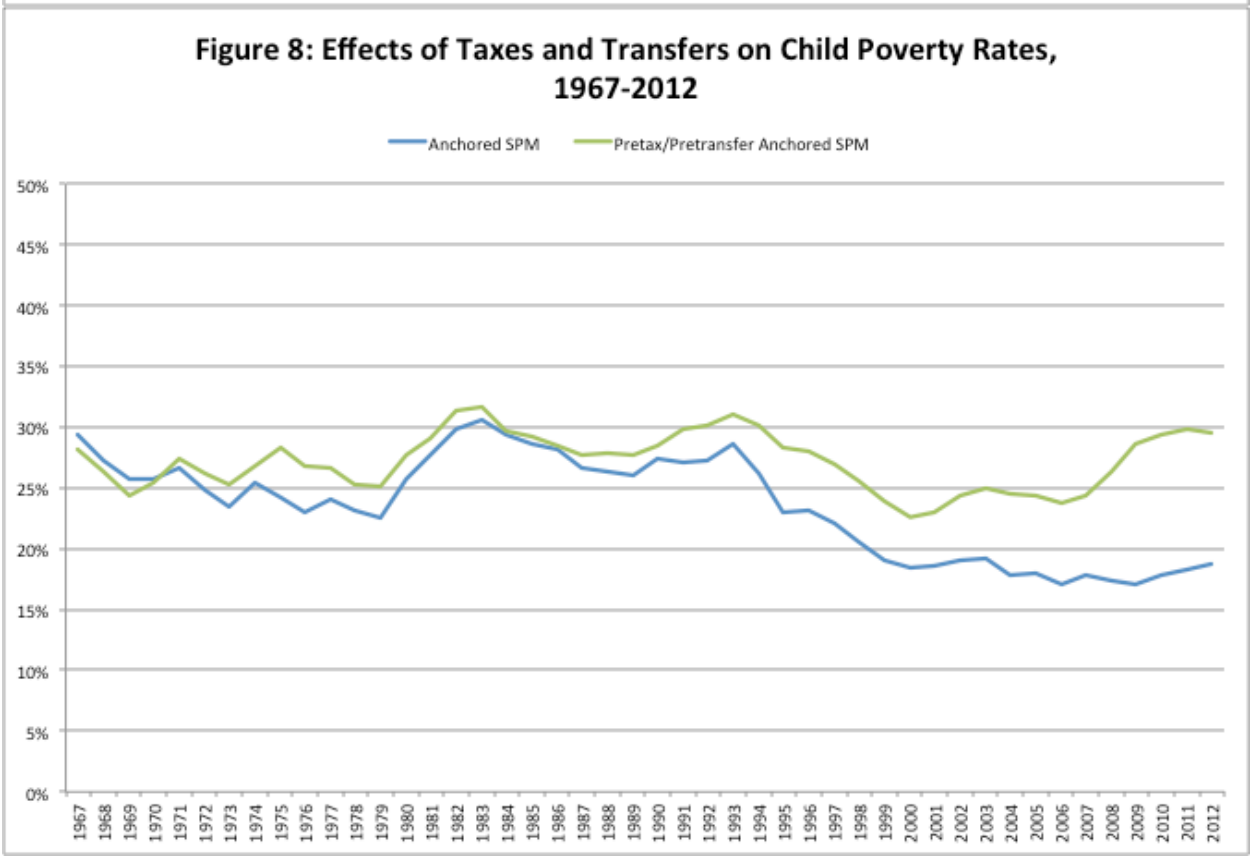


Figure 8: Effects of Taxes and Transfers on Child Poverty Rates, 1967-2012



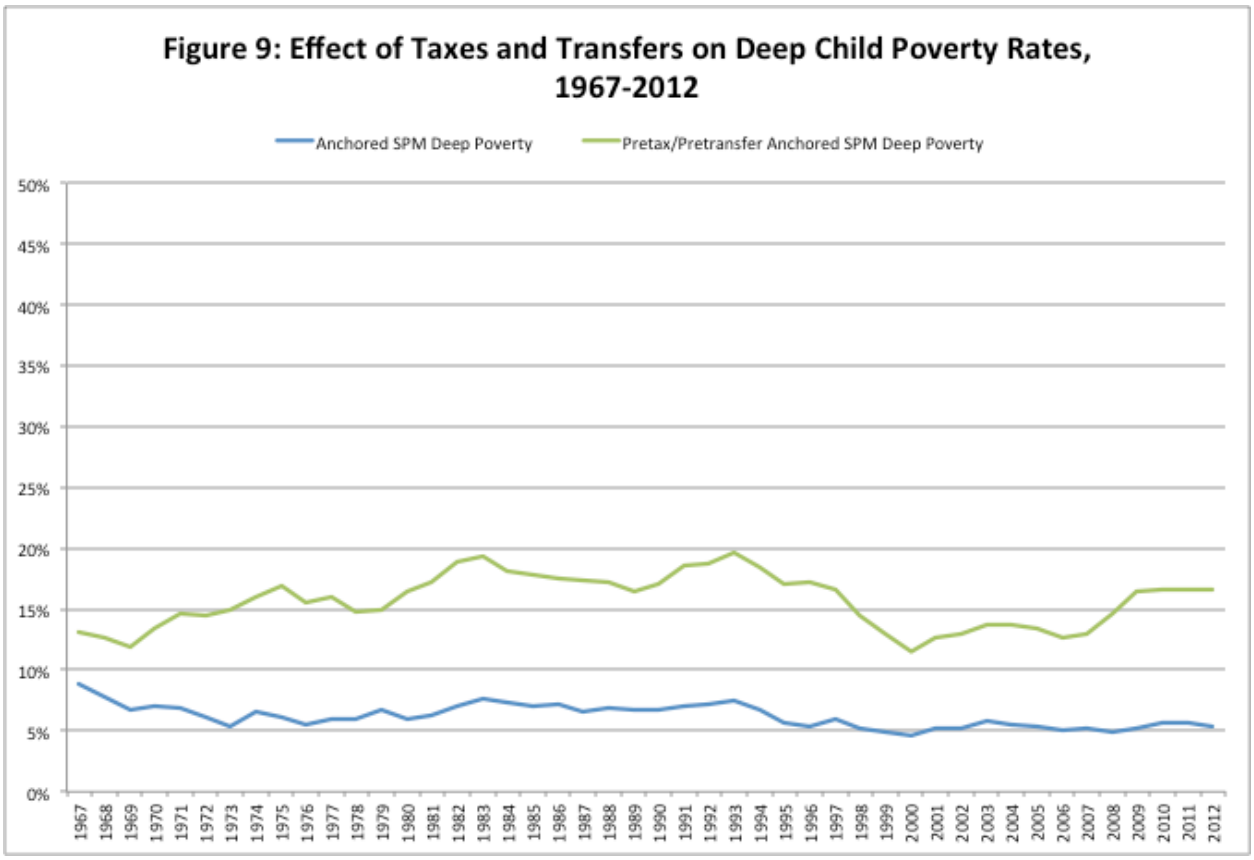


Figure 9: Effect of Taxes and Transfers on Deep Child Poverty Rates, 1967-2012
Anchored SPM Deep Poverty
Pretax/Pretransfer Anchored SPM Deep Poverty
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
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2004
2005
2006
2007
2008
2009
2010
2011
2012

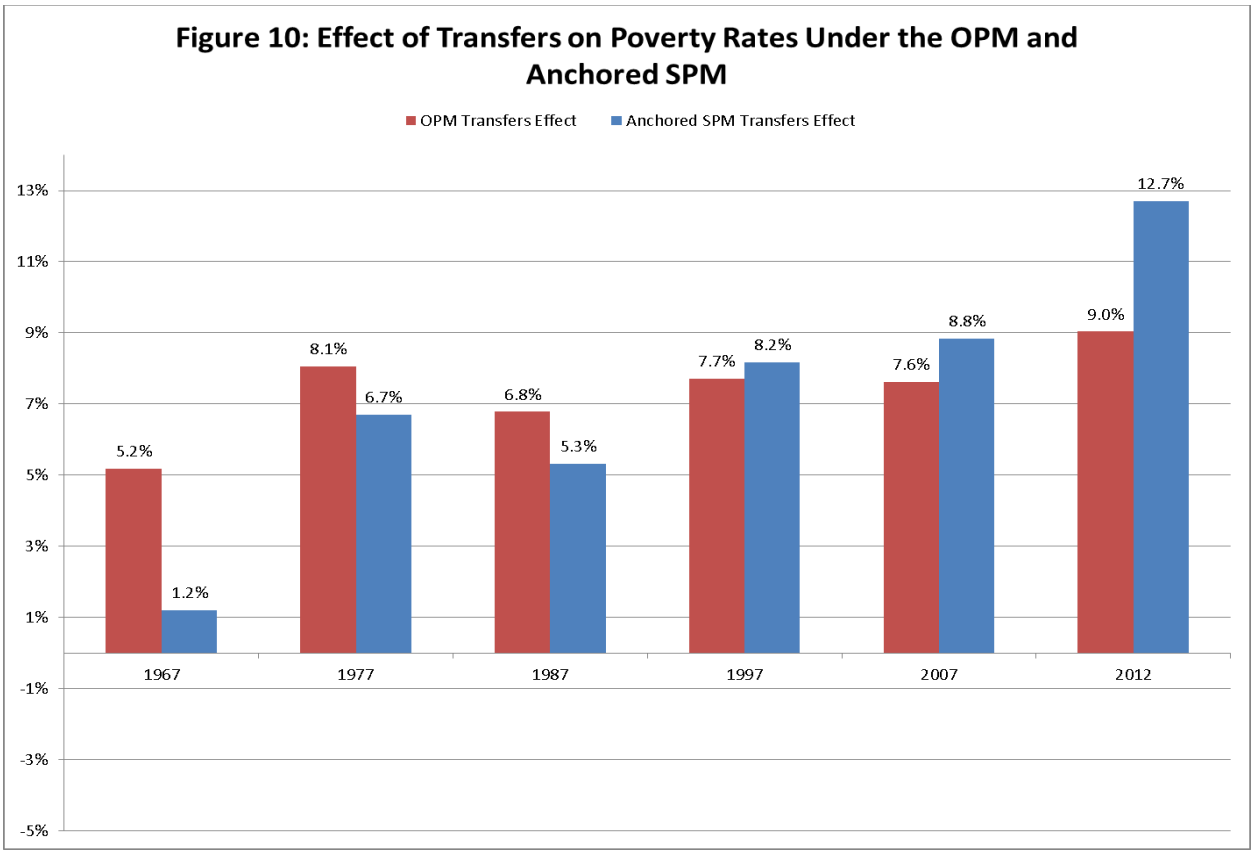
Figure 10: Effect of Transfers on Poverty Rates Under the OPM and Anchored SPM
OPM Transfers Effect
Anchored SPM Transfers Effect
13%
11%
9%
7%
5%
3%
1%
-1%
-3%
-5%
5.2%
1.2%
8.1%
6.7%
6.8%
5.3%
7.7%
8.2%
7.6%
8.8%
9.0%
12.7%
1967
1977
1987
1997
2007
2012

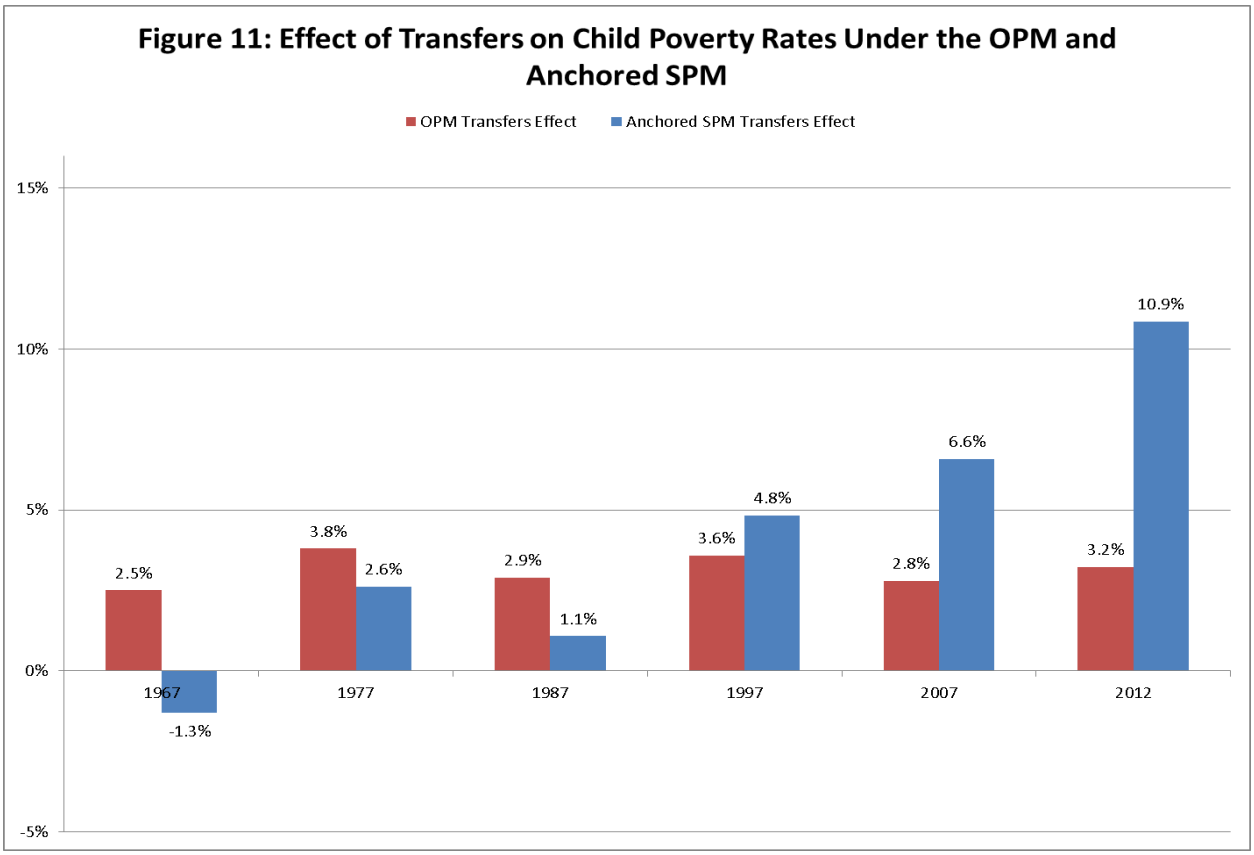
Figure 11: Effect of Transfers on Child Poverty Rates Under the OPM and Anchored SPM
OPM Transfers Effect
Anchored SPM Transfers Effect
15%
10%
5%
0%
-5%
2.5%
-1.3%
3.8%
2.6%
2.9%
1.1%
3.6%
4.8%
2.8%
6.6%
3.2%
10.9%
1967
1977
1987
1997
2007
2012

Technical Appendix

This appendix provides more detail about the methods used to construct our historical SPM series.

Poverty Units

Unmarried partners are directly identified in the CPS since 1995, so for years prior to that we must seek to identify them through other means. We use the well-established adjusted-POSSLQ routine (which stands for Persons of the Opposite Sex Sharing Living Quarters). We follow Casper, Cohen and Simmons (1999), who define an adjusted POSSLQ household as one that meets the following criteria: two unrelated adults (age 15+) of the opposite sex living together, with no other adults except relatives and foster children of the reference person, or children of unrelated subfamilies.

Prior to 1988, it is not possible to identify foster children in the CPS (and instead they are coded as unrelated individuals), so foster children between the age of 15-22 are excluded from SPM family units from 1967-1987.

From 2007 onwards, detailed relationship codes make it possible to identify and include both biological parents of a child in a household even if these individuals do not claim to be unmarried partners. However, prior to 2007, these detailed relationship codes are not available, so we must rely on relationship codes of individuals in reference to household head or family reference person. Prior to 1975, only relationship to household head exists, not relationship to family head.

Equivalence Scale

We follow the Census Bureau in using a three-parameter equivalence scale to adjust poverty thresholds for poverty-unit size and composition. This equivalence scale is as follows:

Families without children:
$Equivalence\ scale=(adults)^{0.5}$
Single parents:
$Equivalence\ scale=(adults+0.8*first\ child+0.5*other\ children)^{0.7}$
All other families:
$Equivalence\ scale=(adults+0.5*\ children)^{0.7}$

Geographic Adjustment

The SPM adjusts poverty thresholds for geographic differences in the cost of housing. Specifically, they use five-year American Community Survey data on rental payments in metropolitan areas to adjust the shelter and utilities component of the SPM poverty thresholds. In contrast, our historical-SPM estimates do not yet adjust poverty thresholds for geographic differences in cost-of-living given the paucity of consistent data back to 1967 necessary to

implement geographic adjustments. Developing a method of implementing a consistent geographic adjustment over time remains an important area for future research. For more on geographic adjustment under the SPM, see Renwick (2011).

Mortgage Status

Data for constructing thresholds by housing status are not consistently available for all years. From 1976-2008, the CPS asks respondents whether they owned or rented their dwelling, but not about their mortgage status, a question has been included since 2009. There are no housing tenure questions in the CPS prior to 1976.

To follow the Census SPM methodology, which require thresholds based on three housing status groups, we imputed mortgage status from the CEX to the CPS in 1980-2009 and in 1972/73. This imputation included poverty status, age, race, education and marital status of household head, family size and region as well as race*education interactions and race*age interactions. For the intermediate years 1974-1979 the coefficients were linearly interpolated and applied to CPS data to estimate predicted likelihoods of having a mortgage among home owners. For 1967-1971, the same annual rate of change in the relationships between 1972/3-1980 was assumed and extrapolated to the earlier years.

Prior to 1974, a two-step imputation process was applied, first to determine ownership vs renter status and second to determine mortgage status among owners. The first imputation included the same covariates as the mortgage status imputation described above but also included deciles of income and welfare recipiency. The incidence rate of ownership was constrained to match the incidence in the CEX.

SNAP

To impute SNAP benefits into the CPS for years prior to 1979, we first impute receipt of benefits to household heads or primary individuals (which we jointly call "heads"). To accomplish this, we first estimated the percent of heads in 1980 who reported receiving food stamps in 1979. We then harnessed administrative data on caseloads published by the USDA. The USDA provides annual caseloads (average monthly caseloads for a given year) for every year back to 1969. We were able to add caseloads back to 1967 using data from the Statistical Abstract(s) of the United States to create a consistent time series across the entire period. We then took the estimated percent of heads receiving food stamps in 1979, and estimated the same percent for prior years using rate of change in the caseload after adjusting for overall population growth. This estimated percent of heads receiving food stamps then served effectively as the percentage of heads we would constrain our imputation to. It should be noted that SNAP receipt is underreported in the CPS, such that by taking the percentage of reported receipt in the 1980 CPS and deflating it backwards historically using *changes* in the caseload, our imputation procedure produces similarly underreported estimates of SNAP in earlier years, such that no break will appear in trend lines starting when SNAP receipt is self-reported. This is also true for our other imputations.

The basic method for deciding who to assign SNAP receipt to in a given year of the CPS was to run a linear probability model within the 1972-1973 Consumer Expenditure Survey predicting receipt of food stamps among consumer unit heads. The factors used to predict SNAP receipts were receipt of public assistance/welfare, number of children, unemployment status, a dummy for having one adult in the family, a dummy for having 3 or more adults in the family, age categories, education categories, race, family size, a dummy for being married, and race x education interaction terms. We then computed the predicted probability of receiving food stamps from this model, and used the same covariates from that model in a given year of the CPS to impute CPS heads' probability of receiving food stamps. The constraint factor was then used to determine the cutoff for assigning SNAP receipt. For example, if we estimated that 6 percent of heads in the CPS should be receiving food stamps in a given year, we would assign the 6 percent of CPS heads with the highest predicted probability of receiving food stamps as the group for whom we impute a benefit.

The next step in our imputation process is to actually assign a value to the food stamps received. It is worth noting that in the 1970s, the Food Stamp Program still had a "purchase requirement," which depending on your income, would dictate how much a family would have to pay for, say, $100 worth of food stamps. So the value of the benefit in the 1970s is the difference between the total value of the benefit and the amount families are required to purchase that total value. This is called the "bonus value," and is the amount we attempted to impute to recipients. To accomplish this, we used a hotdeck procedure based on poverty status, receipt of other public assistance, number of children, and number of adults. We cross-classified these variables into 36 mutually exclusive groups, and found ten deciles of bonus values within each group. We find the same mutually exclusive groups in the CPS for a given year, and within these groups randomly assign people to the decile values established for their group in the CEX. Since the CEX is from 1972-73, we then updated estimated imputed values for inflation using the CPI-U. This estimated benefit value was then assigned to everyone else in the heads' SPM unit. To bring values up from 1972-73 to, say, 1976, we inflate the imputed values by the ratio of the average benefit level in 1976 to the average benefit level in 1972-73 (an average of those two years' average benefit levels).

School Lunch Program

Our approach for imputing participation in the school lunch program is largely similar to our imputation of SNAP, and included the same set of predictors. Because no information exists on this program in the 1972-73 CEX, however, our dataset used for imputation is the 1980 CPS. As with SNAP, we constrain the percentage of heads down (or up) each preceding year scaled by changes in the administrative caseload. The administrative data here comes from the USDA and was compiled back to 1969 by Robert Moffitt and his colleagues. We extended the series back to 1955 using information from the Statistical Abstracts of the United States. To assign monetary values to those for whom we impute benefit receipt, we use the same model but predicting the 1980/79 family value of school lunch calculated by the Census. We then deflate this benefit by the CPI-U.

WIC

Our procedure for imputing WIC benefits into the CPS is a two-step procedure. First, for years prior to 2001, we imputed WIC incidence at the household level. Second, we calculate the benefit value for all years using administrative data on average per person WIC expenditures (see: http://www.fns.usda.gov/pd/wisummary.htm).

WIC Incidence: From 2001 onwards, the number of WIC recipients per household was reported in the CPS. However, as nearly all families (>95 percent) who reported receiving WIC, only reported receiving it for a single family member, we only impute a yes/no incidence instead of the number of recipients per household. To estimate incidence, we first identified all families currently automatically income-eligible for WIC: those currently receiving food stamps, public assistance or Medicaid, with at least one child age 5 or below. While WIC is also available for pregnant women without children, we have no way of identifying pregnant women in the CPS. WIC also has a nutrition risk requirement for eligibility based on medical/nutritional guidelines that we cannot observe in the CPS, so some income eligible families would likely be nutritionally ineligible, but we cannot distinguish between these families in the CPS.

To constrain the number of recipients, we first estimate the share of WIC income-eligible families from the CPS to administrative participation data for 2001-2010 and then constrain the number of recipients in earlier years to match this ratio. We use OLS regression to estimate the likelihood of WIC receipt among income eligible families, based on number of eligible kids, household income and poverty status. While WIC was permanently established in 1974, only a small number (88,000) individuals participated. As a result, we do not believe we can accurately identify recipients in this year and estimate WIC beginning in 1975.

WIC Value: We calculate WIC value by multiplying the average annual WIC food costs per person (based on monthly USDA administrative costs*12 from http://www.fns.usda.gov/pd/wisummary.htm) by the number of recipients per household (which is 0-4 from 2001-2011 and 0-1 prior to 2001). This value is then divided evenly among household members and summed for SPM family units.

Housing Assistance

Our imputation model for receiving housing assistance is largely similar to that for SNAP and school lunch, though here we predict for renting heads. The administrative data are also somewhat different. We begin with a time series produced by Robert Moffitt and colleagues and taken from HUD data that shows total households receiving direct housing assistance administered by HUD. This series, however, only exists back to 1977. So we take a second series, total outlays for discretionary housing assistance, which we were able to extend back to 1962 (Moffitt's tables go back to 1970). The source of the data is the same as Moffitt's, White House historical budget tables. When expressed in constant dollars and compared against the total number of households receiving direct housing assistance, however, we find that the cost per household rose substantially over time between 1977 and the present. This may be because the universe of what is covered under all discretionary housing assistance is larger and changes over time relative to the number of units assisted under low-income housing assistance programs like public housing and Section 8. Nevertheless, this makes it difficult to know how best to "back out" the number of households receiving assistance for years prior to 1977, which is the

administrative data series we would ideally want. The trend in "cost per household," however, between 1977 and the present (2009) was roughly linear, however. So we assume that this trend would extend back in time between 1967 and 1977. So with the total dollars spent and our estimate of the number of dollars per household, we are able to divide out and reach an estimate of the total number of households assisted. We then use this to constrain the percentage of households we assign subsidy receipt to from the imputation model.

The Census values housing assistance by taking the lesser of (a) the shelter portion of the threshold minus estimated rental payments, or (b) the market value of the housing unit minus estimated rental payments (for an extended discussion see Johnson et al., 2010). We lack adequate data to fully estimate rental payments and market values of housing units back to 1967. We therefore adopt a simpler approach. To estimate rental payments, we assume that people spend 30 percent of their household income on rent. This is a simplification of more complex HUD guidelines, but modeling the more complex HUD guidelines would require knowing more information than is available in the CPS all the way back to 1967. We then estimate the value as the shelter portion of the threshold minus these estimated rental payments. When this simpler approach is executed in data where we have the actual SPM (2009 to 2011), we find that our approach leads to an overestimate of the impact of housing subsidies on poverty rates. We therefore examined the ratio of Census estimated housing subsidy values to our subsidy values in each year and found them to be approximately 89 percent in all three years at the median. So we applied a correction factor of .89 to our estimated housing subsidy valuation in all years. This correction factor yielded much closer estimates of the impact of including housing subsidies on poverty rates in 2009 to 2011. Improving the historical estimation of housing subsidy valuation is an important area for future work.

Taxes

After-tax income is not available on the CPS files before 1979/80. So we used NBER's Taxsim Program to calculate our after-tax estimates for earlier years. The starting point for our tax programs are Stata programs provided by NBER and created originally by Judith Scott-Clayton. We modify these for earlier years as income components that can go into the tax calculator begin falling off of the CPS or become combined with other categories of income in the CPS. We also made the simplifying assumption of using $0 versus positive income in the determination of filing status (as compared to legal filing requirements) as we were not able to locate historical data on tax filing requirements. Since such data surely exists, this is an important area for potential improvement in our tax models in the future. We observed no major deviation in the distribution of our after tax income variables, however, between 1978 and 1979

NBER's Taxsim program only calculates state tax rates back to 1978. Prior to 1978, we estimated family state income tax liability after credits by multiplying the median share of state to federal tax liability for each state by each family's estimated federal tax liability. Prior to 1976, not all individual states are identifiable in the CPS and instead regional groupings or combinations of several states are provided. In these cases, we used the median tax rate for families in the combined region.

MOOP

Medical out-of-pocket expenses (MOOP) are imputed from the CEX to the CPS for all years. We use a hot-deck imputation strategy to calculate deciles of MOOP expenditures for consumer units in the CEX for 10 imputation groups, based on: number of elderly in family (0,1,2), an indicator for families of 1, and poverty level (below 200% and >=200% FPL). The distribution of MOOP expenditures in each imputation group is preserved by randomly assigning deciles of expenditures to the same imputation groups in the CPS. Finally, total MOOP expenditures are then capped at $6,700/person (adjusted to nominal dollars using CPI-U), which is the 2011 Medicare Advantage Part D non-premium cap, per recommendations in Korenman and Remler (2012). This method indirectly imputes incidence for various demographic groups since deciles of $0 in expenditures would remain in both datasets, but it does not force an exact percentage.

For 2011, the single year of overlap between MOOP expenditures asked in CPS and our imputed measure, our imputed estimate of MOOP estimates the overall median expenditures and the distribution fairly well, with some underestimation at the 95th and 99th percentiles of expenditures (see Table A1 below). However, using our capped, imputed MOOP measure as opposed to the CPS measure has a relatively minor impact on overall SPM poverty rates. A more comprehensive imputation measure would include health insurance status, but unfortunately that is not available in the CEX (unless premiums were paid for by the consumer unit).

We use the same CEX sample as we do for poverty thresholds (see above), which is a five-year moving sample from 1984-2011 with progressively fewer years of CEX data back to 1980, and then single-year estimates of MOOP expenditures for 1972/73 and 1980. For the intermediate years 1974-1979 the decile expenditures were linearly interpolated. For 1967-1971, the same annual rate of change in the expenditures between 1972/3-1980 was assumed and extrapolated to the earlier years.

Table A1: MOOP Distribution, 2011 CPS

	Overall			*Families with 0 elderly*		
	Actual from CPS	Capped Imputation	Diff	Actual from CPS	Capped Imputation	Diff
1%	0	0	0	0	0	0
5%	0	0	0	0	0	0
10%	0	0	0	50	0	-50
25%	486	486	0	400	215	-185
Mean	3,437	3,142	-295	3,544	2,688	-856
50%	2,277	2,277	0	1,835	1,600	-235
75%	5,104	4,976	-128	4,750	4,005	-745
90%	8,316	7,979	-337	8,700	7,979	-721
95%	14,110	11,071	-3,039	12,168	11,071	-1,097
99%	17,224	13,400	-3,824	22,180	11,071	-11,109

	Families with 1 elderly			*Families with 2+ elderly*		
	Actual from CPS	Capped Imputation	Diff	Actual from CPS	Capped Imputation	Diff
1%	0	0	0	0	1,025	1,025
5%	100	1,117	1,017	1,157	2,314	1,157
10%	480	1,158	678	2,314	2,360	46
25%	1,357	1,616	260	3,187	4,120	933
Mean	4,153	3,870	-282	7,250	6,932	-318
50%	2,803	2,995	192	5,733	5,984	251
75%	5,260	5,225	-35	9,194	9,836	642
90%	8,934	7,814	-1,119	13,414	13,400	-14
95%	12,237	10,937	-1,299	16,514	13,400	-3,114
99%	22,287	14,413	-7,874	27,897	18,183	-9,714

Child Care/Work Expenses

Child care expenditures are imputed from the CEX to the CPS for all years. We utilize a two-step procedure to estimate child care expenditures. We first use the CEX to predict the likelihood of using paid child care using the following covariates: number of children (1, 2, 3+), number of adults in household (1, 2, 3+), poverty dummies (<100%, 100-200% and >200% FPL), head age (<25, 25-34, 35-44, 45-54, 55-64, 65+), race (white, black, other), education of head (LTHS, HS, SC, BA+), family size, married, race*education interactions, race*age interaction, and a region indicator (Northeast, Midwest, South, West). We then apply these regression coefficients to the relevant CPS year and predict the likelihood of paid child care for each household. We constrain paid child care incidence in the CPS to match paid child care incidence in the CEX by number of adults present in the household (1, 2, 3+).

After incidence is determined, we used a hot-deck imputation strategy to assign deciles of child care expenditures to heads in the CPS based on: poverty level (<100%, 100-200% and >200% FPL), # of children (1, 2 and >=3) and family status (married, unmarried, 3+ adults). We use the same CEX sample and interpolation strategy as we do in the MOOP estimates (see above).

Work Expenses

Work expenses (e.g., commuting costs, uniform purchases, etc) are estimated based on an analysis of the Survey of Income and Program Participation (SIPP) provided to us by the Census Bureau. Using the SIPP, they estimate a median weekly value of work expenses from 1997 to 2011. We fix this value historically adjusting for CPI-U. Total work expenses for the consumer unit are then calculated as 85 percent of median work expense multiplied by the number of weeks worked, and summed for all workers above age 17 in the unit as per NAS panel recommendations.

Child care expenditures and work expenses are combined and then capped so that their total does not exceed the reported earnings of the lowest earning spouse/partner in the family