Alternative Strategies for Grouping People into Resource Units: Measuring Poverty in the American Community Survey

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Short Abstract:

Poverty experts and researchers are interested in developing Supplemental Poverty Measure (SPM) local area estimates using the American Community Survey (ACS). One challenge is that detailed information does not exist about the interpersonal relationships of individuals not related to the householder. The Census Bureau assumes those individuals are their own resource unit. Taking advantage of family interrelationship variables from the 2010 ACS Integrated Public Use Microdata Series (IPUMS), this paper investigates how poverty estimates change when additional interpersonal relationship information is available. It also analyzes what happens to poverty estimates when cohabiting partners, foster children, and other children unrelated to the householder are grouped with the primary resource unit. We find that having additional information about subfamily interrelationships of unrelated individuals does not change overall poverty estimates. However, including the cohabiting partner of the householder, foster children, and other unrelated children in the primary resource unit does influence poverty estimates.

Introduction

Measuring poverty, by nature, involves understanding how individuals within a household share resources. Households can be comprised of one person or multiple individuals. At the most complex level, they consist of multiple individuals who live together and interact in varying degrees. Families living in poverty face scarce economic resources. Often the need for additional income and support can influence the configuration of extended family households or unrelated person households. It is important to understand how changing assumptions about grouping individuals into resource units affects poverty estimates. (Goode 1963; Bauman 1999; Iceland et al. 1999; Iceland 2000; Short and Smeeding 2005; Ruggles and Heggeness 2008; Short 2009; Bishaw 2011; Provencher 2011)

This paper attempts to understand how changing assumptions about the configuration of individuals into a resource unit influence the measurement of poverty. It defines four different types of resource units and analyzes how poverty estimates change under the varying resource unit assumptions. The American Community Survey (ACS) Public Use Microdata Sample (PUMS) is used to report variation in poverty estimates at the state level using alternative resource units and the official poverty threshold.

Background

The Census Bureau has been producing the official measure of poverty for the United States since the 1960s. The official measure determines a family's poverty status by comparing before-tax cash income (resources) to a specific dollar value threshold from a matrix of thresholds that vary by family size and composition.[2] While the current official measure has

[2] The poverty universe for the official measure excludes individuals under age 15 who are not related to the householder.

changed minimally since its inception, the Census Bureau and the research community continue to investigate alternative methods for measuring poverty. Throughout the last two decades, the research community, including a National Academy of Science (NAS) Committee on National Statistics (CNStat) panel, developed and evaluated alternative poverty measurements (Citro and Michael 1995).[3] During this period, the Census Bureau calculated and released a variety of alternative poverty measures.[4]

In 2009, the Office of Management and Budget's (OMB) Chief Statistician formed an Interagency Technical Working Group on Developing a Supplemental Poverty Measure. With guidance from this group, the Bureau of Labor Statistics and the Census Bureau developed a new Supplemental Poverty Measure (SPM) that defines thresholds and resources in a manner different from the official poverty measure (Observations from the Interagency Technical Working Group on Developing a Supplemental Poverty Measure, p. 1). After soliciting comments on developing the SPM in the U.S. Federal Register (Bureau of Census 2010), the Census Bureau, in coordination with the Bureau of Labor Statistics, released the first set of SPM estimates in November 2011 (Short 2011b).

The Census Bureau has published a series of working papers on resource and economic variables for inclusion into the SPM and on the effect of geographic adjustments (Short 2011a, Short 2011b, Renwick 2011, Hokayem and Garner 2011, Caswell and Short 2010). These papers focus on advancing our understanding of alternative poverty thresholds and household resources when estimating poverty. They identify alternative measures of poverty thresholds and household economic resources to include in total resource unit income and examine the effect of

[3] See also http://www7.nationalacademies.org/cnstat/Workshop_on_Experimental_Poverty_Measures.html
[4] See http://www.census.gov/hhes/povmeas/index.html for more information.

changes in these thresholds and resources on overall poverty estimates. Resources considered include Earned Income Tax Credit (EITC), childcare expenses, medical expenses, transportation and other work-related expenses, as well as geographic adjustments to the cost-of-living.

Citro and Michael (1995) provide an overview for understanding the importance of modern day household configurations in order to accurately identify resource units for poverty analysis. They argue for the inclusion of cohabiting partners and other household members, such as children unrelated to the householder, but acknowledge that more research is needed to fully understand the dynamics of the resource unit and its influence over poverty estimates.

Recently, researchers have examined the most appropriate unit of analysis for the SPM. Short (2009) takes advantage of detailed information on relationships among household members in the 2007 Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) and evaluates how incorporating children under age 15 who are unrelated to the householder into the primary resource unit influences poverty estimates.[5] Provencher (2011) studies changes in poverty rates that result from including unmarried cohabiting partners, foster children under age 22, and children under age 15 who are unrelated to the householder in the resource unit and compares estimates of the SPM using the 2010 CPS ASEC.

Subfamily relationship variables within the CPS ASEC dataset facilitate research on the resource unit because of the detailed relationship variables available. However, CPS ASEC does not allow for local geographical area analysis. Bishaw (2011) uses the American Community Survey (ACS) to define a unit of analysis that includes cohabiting partners, foster children, and

[5] CPS ASEC contains detailed information on both related and unrelated subfamily relationships. Specifically, for example, the parent(s) of the householder's grandchild(ren) is(are) identified as the parent of that child(ren) if the parent(s) live(s) in the household. The ACS does not contain such detailed information. It only contains the relationship status of each person in the household to the householder. For example, it is not possible to identify with certainty who the parent(s) of the householder's grandchild(ren) is(are).

unrelated children. However, since detailed relationship information is unavailable in the ACS, his research assumed that all adults unrelated to the householder were their own resource unit. We expand on his work by developing a methodology for identifying unrelated subfamilies using IPUMS family interrelationship variables and estimating poverty using four different resource units.[6]

Identifying Family Relationships with Limited Data

In an effort to accurately capture and understand family dynamics within ACS data, at least two organizations besides the Census Bureau have used and developed methods for identifying subfamily units within households and have now applied these methods to the ACS. These organizations are the Minnesota Population Center (MPC) and the New York Center for Economic Opportunity (NY CEO).[7]

Family Interrelationship Variables at the Minnesota Population Center

The Minnesota Population Center (MPC) developed an extensive methodology for the creation of family interrelationship variables.[8] These variables are used to construct subfamily units. The MPC creates their family interrelationship variables by making logical assignments based on other Public Use Microdata Samples (PUMS) variables, including surname (when available), relationship to the householder, age, sex, marital status, children ever born, race, and

[6] The Minnesota Population Center, under the direction of Dr. Steven Ruggles, develops the Integrated Public Use Microdata Series (IPUMS) family interrelationship variables, which are available for all CPS, ACS, and decennial PUMS data.
[7] For more information, see www.ipums.org and http://www.nyc.gov/html/ceo/html/home/home.shtml, accessed March 28, 2012.
[8] Family interrelationship variables are sometimes referred to as pointer variables. Pointer variables are variables that point to another individual within the household and identify the particular relationship of that person in relation to the person the variable is pointing to.

location on the roster. The MPC uses a hierarchy of rules to determine familial relationships within the household.[9] The first rule is an unambiguous self-identified relationship with the householder, which is based on the relationship variable. Sequential rules depend on familial relationships of other relatives (e.g. grandchildren of householder), marital status, age, gender, and proximity to one another on the household form. MPC constructs these variables and subfamily units for all persons in each household, including those who are not related to the householder (Ruggles 1995; Sobek and Kennedy 2009; Schroeder 2010).[10]

The MPC makes data and documentation for these variables available via the Integrated Public Use Microdata Series (IPUMS) website for the Decennial Census, Current Population Survey (CPS), American Community Survey (ACS), and other Census data products (Ruggles et al. 2010). The MPC creates IPUMS data with the Census Bureau's PUMS files. However, IPUMS is not a Census Bureau product.

NY Center for Economic Opporunity's Minimal Housing Unit

In order to use ACS to estimate local geographic area estimates of poverty for the city of New York, the New York City's Center for Economic Opportunity (NYC CEO) has adapted a Minimal Housing Units (MHU) definition as a resource unit (Virgin 2011).[11] The NYC CEO's family interrelationship variables are constructed using variables such as relationship to the householder, marital status, and age to identify and assume family relationships. Once family relationships are created, they are then used to construct a MHU, which identifies subfamilies

[9] For a detailed description of the hierarchical rules for determining familial relationships within the household, see http://usa.ipums.org/usa-action/variables/MOMRULE#description_tab, accessed March 28, 2012.
[10] For more information on family interrelationship variables, see http://usa.ipums.org/usa/chapter5/chapter5.shtml, accessed March 28, 2012.
[11] Minimal Housing Units (MHU) were originally developed by Ermisch and Overton (1985).

within a household. These subfamilies are used by NYC CEO to calculate poverty rates for New York City.

Census Bureau's Subfamily Units

The Census Bureau's Public Use Microdata Samples (PUMS) do not include spousal and parental pointer variables like those provided by the MPC, but they do include subfamily variables for individuals related to the householder derived from a very similar logic. The Census PUMS's subfamily variables are constructed using sex, age, relationship status to the householder, marital status, and surname (e-mail communication with Census ACS team on 09/19/2011). The Census Bureau PUMS files *do not* provide subfamily variables for persons not related to the householder.

While there is some evidence that the algorithms used by the Census Bureau and MPC produce significantly different results for related subfamilies (Schroeder 2010), those differences do not affect the analysis in this paper. As is described in more detail below, subfamily relationships among those related to the householder are not relevant to either the official or SPM resource units. For both poverty measures, everyone related to the householder is in the same resource unit, regardless of subfamily membership. Relationships among people not related to the householder are critical for identifying poverty resource units for individuals not related to the householder. For the purposes of this paper, IPUMS unrelated subfamily classifications are used in order to group unrelated individuals into subfamilies, which can then be treated as independent resource units for calculating poverty estimates.

Poverty Resource Unit

Both the official poverty measure and the SPM recognize that people who live together may share resources. The thresholds in the official matrix and the thresholds used in the SPM recognize the benefit of economies of scale when people live together. An extensive body of research is devoted to how people living in the same household share resources and expenses (Fiegehen and Lansley 1976; Ermisch and Overton 1985; Carlson and Danzinger 1998; Bauman 1999; Iceland et al. 1999; Iceland 2000; Short and Smeeding 2005; Short 2009). Much of this research underpins the importance of the resource unit on poverty estimates, showing that grouping individuals under differing assumptions about how they share resources within the household varies poverty estimates.

Resource units are challenging to define as we do not always know exactly how individuals within a household share resources. The official resource unit for poverty estimates includes any individual related by birth, marriage, or adoption. Citro and Michael (1995), in their recommendations for an improved poverty measurement, suggest the importance of including cohabiting partners and unrelated children within the family resource unit. This suggestion reflects the growing normality and stability with which cohabiting partners live together and share resources outside of the context of marriage (Kennedy and Bumpass 2008). It also acknowledges that unrelated children within the household are receiving support from the household's primary family unit if they are not a part of their own separate unrelated subfamily unit.

Those engaged in research to improve resource units generally find that overall estimates of poverty do not change very much or decrease slightly when broadening the resource unit to include other unrelated individuals, such as cohabiting partners (Carlson and Danziger 1998;

Bauman 1999; Iceland 2000; Short and Smeeding 2005; Short 2009; Bishaw 2011). Iceland (2000) wrote about the 'Family/Couple/Household' unit of analysis in poverty measurement and found little difference in poverty estimates when using four different units of analysis. He suggests that the differences are greatest for nontraditional household arrangements and children of cohabiting partners.

In defining a "resource unit" for purposes of the SPM, the Interagency Technical Working Group suggested it should consist of "…all related individuals who live at the same address, any co-resident unrelated children who are cared for by the family, and any cohabiting partners and their children (6)."[12] This definition expands on the definition of resource unit previously used to measure official poverty, which identified a resource unit as only those household members related by birth, marriage, or adoption. While the prominent issue at hand was to define and develop a supplemental poverty measure, a corresponding problem was to develop a new *resource unit* within the current structure of U.S. data sources.

For the purposes of this paper, four different resource units are developed and used. Table 1 provides detailed definitions of each resource unit. The Official Resource Unit Basic (ORUB) is similar to the resource unit used when calculating official poverty estimates with official poverty thresholds. The Official Resource Unit Extended, which is referred to as ORUE in this paper, is similar to the official resource unit but adds IPUMS family interrelationship variables for unrelated individuals. This allows those individuals to be grouped as subfamily resource units. The Supplemental Resource Unit Basic (SRUB) is similar to the resource unit used for poverty estimates of the supplemental poverty measure (SPM). It is the official resource unit plus

[12] For more information on the Interagency Technical Working Group recommendations, see http://www.census.gov/hhes/www/poverty/SPM_TWGObservations.pdf, accessed March 26, 3012.

cohabiting partners, foster children under age 22, and children unrelated to the householder who are under age 15. The Supplemental Resource Unit Extended (SRUE) is the official resource unit plus cohabiting partners, foster children under age 22, and children unrelated to the householder who are under age 15, plus the addition of IPUMS family interrelationship variables for individuals unrelated to the householder. Again, this allows those individuals to be grouped as subfamily resource units for poverty estimates.

Data and Methodology

The Census Bureau provides researchers with a variety of data resources for studying poverty. The Current Population Survey (CPS), the American Community Survey (ACS), and the Survey of Income and Program Participation (SIPP) all publish poverty statistics on a regular basis.[13] OMB Directive 14 established the Current Population Survey as the source for the official poverty measure.[14] The CPS, via personal visit and telephone interview, collects detailed information on income, resources, and family interrelationships. The CPS sample size is relatively small, however, so researchers studying small areas must rely on the ACS.

The main advantage of the ACS is that it also includes information on dozens of other social and economic variables from a sample of more than 4.5 million people a year. But the ACS's main limitations for poverty research is that it collects less detailed information on household resources and collects no information on subfamily relationships and relationships between people who are not related to the householder. Child-parent relationships are often not explicit even among those persons related to the householder. For instance, if a household

[13] The Small Area Income and Poverty Estimates program (SAIPE) provides small area model-based estimates of poverty as well.
[14] For more information, see http://www.census.gov/hhes/povmeas/methodology/ombdir14.html, accessed March 28, 2012.

contains a householder, child, and a grandchild, the householder's child is potentially the parent of the householder's grandchild, but ACS data collection does not allow us to confirm this.

The problem is even more challenging among persons not related to the householder, since we cannot make inferences about their relationship to each other based on their relationship to the householder. For example, if a household contains a householder, cohabiting (unmarried) partner, and unrelated child, the child is likely the child of the unmarried partner, but we cannot be sure. Official poverty estimates would create three resource units for this household: the householder, the cohabiting (unmarried) partner, and the unrelated child (who, if under age 15, is excluded from the poverty universe). Having limited relationship information affects ACS poverty estimates for individuals not related to the householder and overall poverty estimates in areas where there are many unrelated individuals.

We attempt to overcome the limitation on poverty measures for unrelated individuals by making use of the logically imputed "family interrelationship" variables in the 2010 ACS Integrated Public Use Microdata Series (IPUMS).[15] The 2010 ACS IPUMS contains a series of family interrelationship variables including variables that point to the location in the dataset of the implied mother, father, and spouse for each person in the household.

The 2010 ACS PUMS dataset contains a sample of 2,981,793 individuals in households.[16] An estimated 5.8 percent are unrelated to the householder in the household where they reside. There are two main options for calculating poverty for these unrelated individuals: (1) assume each person is a one-person resource unit and calculate their individual poverty or (2) group them into unrelated subfamilies based on inferred relationship status using core

[15] We merge the IPUMS family relationship variables with the original PUMS.
[16] This number excludes those in group quarters.

demographic variables like age, sex, and marital status. When estimating poverty rates with ACS, the Census Bureau assumes each unrelated individual aged 15 and up is a one-person resource unit and calculates each person's poverty based on only their own income. The Census Bureau does not calculate poverty rates for unrelated individuals under age 15. This is how the Official Resource Unit Basic (ORUB) is defined for purposes of this analysis.

The 2010 ACS IPUMS data contain inferred subfamily relationships, and individuals who are unrelated to the householder are grouped into unrelated subfamilies based on the IPUMS criteria mentioned above. Once grouped into unrelated subfamilies, poverty can be calculated for the individuals based on their subfamily income. If an unrelated individual is not associated with an unrelated subfamily, their individual poverty rate will be calculated based on their personal income if they are aged 15 or older; for those under 15 years old, their poverty status is not calculated. This is how the Official Resource Unit Expanded (ORUE) is defined for the purposes of this paper.

In this analysis, we compare poverty estimates using three alternative resource units and compare then to the current Census Bureau resource unit approach (ORUB), where individual poverty rates are calculated using individual income for every person age 15 and over who is unrelated to the householder, and where all those related to the householder are in the primary unit and poverty is calculated using the primary resource unit's total income.[17] We first compare what happens to poverty when we use IPUMS subfamily relationship variables to group individuals unrelated to the householder into subfamily resource units (ORUE). We then compare changes in the poverty rate when we change the resource unit to align with the SPM

[17] We use the official poverty thresholds for calculating poverty estimates of the four resource units described. Another paper in this panel looks at the impact of using both the SPM thresholds and the SPM resource measure with ACS data.

resource unit including cohabiting partners and children unrelated to the household head (SRUB). Finally, we use the IPUMS subfamily relationship variables to group unrelated individuals into subfamilies (SRUE). Table 1 provides a definition of the four-resource unit definitions used in this analysis.

We focus on two specific groups in our analysis: children under age 15 who are unrelated to the householder and the cohabiting partner of the householder. We do this for two reasons. First, in official estimates, unrelated children under age 15 are not in the poverty universe, and we are interested in how estimates for this group might alter overall poverty estimates and, particularly, estimates of child poverty. Second, the SPM includes cohabiting partners of householders in the primary resource unit. We are interested in understanding what impact this has on poverty rates in general. We are also interested in the impact on the poverty rate of cohabiting partners. Under the official poverty measure, their poverty status is calculated separately from the primary resource unit. Our results and discussion follow below.

Results

The main motivation for this paper is to understand whether, for the purposes of estimating poverty, it matters that unrelated subfamilies do not have subfamily relationship information with which to group them into respective resource units in the American Community Survey. We approach this using IPUMS inferred family interrelationship variables to group unrelated subfamilies into potential resource units and recalculate poverty estimates for all persons using both official and supplemental resource units. Table 3 and Figure 1 show our results for all four poverty resource units.

Official Resource Unit Basic (ORUB)

When we calculate poverty using official resource units and official poverty thresholds and assume that all unrelated individuals are their own resource unit, approximately 15.0 percent of the total population lived below the official poverty threshold in 2010 (Table 3).[18] Our estimate assumes that all unrelated individuals are their own resource unit and calculates poverty for them separately.[19]

Those individuals who are unrelated to the householder, for whom poverty is calculated based on their own personal income, are especially vulnerable to poverty under this resource unit. Over one-third of all individuals unrelated to the householder (37.6 percent) are in poverty.

Cohabiting partners make up about forty percent (39.1) of all unrelated persons and approximately one-third (31.9 percent) live in poverty. Female cohabiting partners are more likely to be in poverty than male cohabiting partners (37.4 percent compared to 26.7 percent).

Children have higher poverty rates than the total population under this resource unit. Among children under age 15 who are related to the householder, about one-in-five live in poverty (22.1 percent). Recall that under this unit, which replicates the official resource unit, poverty rates are not calculated for children under age 15 who are unrelated to the householder.

Official Resource Unit Expanded (ORUE)

Using IPUMS family interrelationships to group individuals that are not related to the householder into subfamily resource units, we recalculate the overall poverty rate. Adding implied subfamily relationships to unrelated individuals and grouping them into subfamily

[18] This estimate excludes all unrelated children under age 15 (0.3 percent of the population), for whom poverty is not calculated because no income data is collected for them.
[19] Except for those children under age 15, for whom poverty is not calculated.

resource units, which we call Official Resource Unit Expanded (ORUE), does not significantly change overall poverty rates. The only groups for whom poverty estimates change significantly are for individuals unrelated to the householder and children. For both groups, poverty increases. The poverty estimate for unrelated individuals increases from 37.6 percent to 38.5 percent (see Table 3). Child poverty rates increase by approximately 0.3 to 0.4 percentage points for all child subgroups reported on Table 3.

Poverty estimates are calculated for unrelated children under age 15 who are attached to an unrelated subfamily using the IPUMS family interrelationship variables indicating parent's location in the household. IPUMS attached approximately two-thirds (63.0 percent) of all unrelated children under age 15 to one or two parents who were also unrelated to the household head. Over half (55.1 percent) of these children were determined to live in poverty. Whereas the official resource unit (ORUB) leaves these children out of the universe, this resource unit (ORUE) brings them into the universe.

Supplemental Resource Unit Basic (SRUB)

Consistent with prior research, our analysis finds that changing the unit of analysis from the official resource unit to the supplemental resource unit does have an effect on overall poverty estimates. Adding cohabiting partners and unrelated children to the primary family resource unit alone decreases the overall poverty estimate by about one percentage point, from 15.0 percent to 14.0 percent (Table 3).

The change in the resource unit from one similar to the official resource unit (ORUB) to one similar to the SPM resource unit (SRUB) has the largest effect on poverty rates for unrelated

individuals. Poverty estimates for unrelated individuals decrease by 8.1 percentage points (from 37.6 percent to 29.5 percent).

Poverty estimates for cohabiting partners decline by more than half, as poverty rates fall from 31.9 percent to 13.3 percent in poverty. Interestingly, female cohabiting partner poverty estimates decrease more than male cohabiting partner poverty estimates, from 37.4 percent to 11.9 percent. Male cohabiting partner poverty rates decrease from 26.7 to 14.6 percent. Under ORUB, female cohabiting partners were more likely to be in poverty. Under SRUB, male cohabiting partners are more likely to be in poverty. There may be many factors influencing this phenomenon, including gendered differences in wages and income. This is an area for further research.

Poverty rates decrease overall for children in all age groups presented in Table 3. Of particular interest is the decrease in poverty for unrelated children under age 15. ORUB does not calculate poverty estimates for these children. ORUE calculates poverty estimates for this group of children if they can be associated with a mother or father who is also unrelated to the householder. The ORUE poverty estimate for children unrelated to the head is over 50 percent (55.1 percent). SRUB assumes all children unrelated to the householder belong in the primary family's resource unit. Moving unrelated children to the primary resource unit results in a significantly lower poverty rate for them (23.9 percent) compared to the official resource unit with IPUMS unrelated subfamilies (ORUE). Clearly, for this group of children, the resource unit definition matters when calculating poverty estimates.

Supplemental Resource Unit Extended (SRUE)

While poverty estimates for unrelated individuals and all children were significantly different between ORUB and ORUE, there are no significant changes in poverty estimates between SRUB and SRUE (except for unrelated children under age 15).[20] However, differences between ORUB and SRUE are all significant except for youth aged 15 to 17 and differences between ORUE and SRUE are all significant.[21]

For unrelated children under age 15, SRUE places them into the primary family resource unit if IPUMS family interrelationship variables do not attach them with an unrelated subfamily or attach them to a parent that is the cohabiting partner of the householder. An estimated 590,271 children (63 percent) are not attached to the primary family's resource unit, but rather poverty estimates are calculated for them using the unrelated subfamily's resource unit. Under this scenario, their poverty rate is 31.1 percent. This is 24 percentage points lower than under ORUE (where poverty is estimated only for those children attached to an unrelated subfamily) and 7.1 percentage points higher than under SRUB (where poverty estimates for all unrelated children under age 15 are calculated by adding them to the primary family's resource unit).

Changes in Poverty Status Based on Changes in the Resource Unit

While there appears not much change in the overall poverty estimate under our four measures, we are interested changes in individual poverty status based on changes in the resource unit definition. Changing the resource unit definition has the potential to change the poverty status of individuals in either direction. Some could switch from "not in poverty" to "in poverty," while others could switch from "in poverty" to "not in poverty." Changes in overall

[20] Significance tests not reported, but available upon request.
[21] Ibid.

poverty rates show only the net impact of these changes. Since the ORUB estimate best replicates the official poverty measure, we again use it as a base comparison.

Table 4 shows the percent of individuals who experience a change in poverty status when the resource unit definition changes from our base resource unit to one of the three alternative definitions. Notice that most changes in status take place among unrelated individuals for all unit measures. Creating unrelated subfamily resource units using IPUMS subfamily interrelationship variables does not change poverty status for most individuals. Nevertheless, creating supplemental poverty units where cohabiting partners and unrelated children under age 15 move into the primary family resource unit does result in changes in poverty status for individuals unrelated to the householder. Moving from ORUB to SRUB, for example, changes poverty status for about nine percent of all unrelated individuals. This includes a change in poverty status for about one-in-every-four cohabiting partners (23.0 percent). Female cohabiting partners are more likely to experience a change in poverty status than males.

Poverty Estimates by Geography

Since the main advantage of using ACS data to generate poverty estimates is the ability to report local area estimates of poverty, we also examine how poverty estimates change under our four resource units by geographic area. Table 5 and Figure 2 show the poverty rates for the four resource units by state. The vertical line in Figure 2 shows the average poverty rate for the United States using ORUB (15.0 percent), our closest version of the official resource unit with ACS PUMS data.

In general, variations in poverty estimates by state using the official resource unit do not change drastically when the supplemental resource unit is used. In all cases, the supplemental

resource unit decreases poverty. As with the total U.S. population, adding inferred unrelated subfamily units does not make a large difference when either the official resource unit or the supplemental resource unit are used (in comparison to having calculated them assuming all unrelated individuals are their own poverty unit).

Conclusion

In this paper, we attempt to group individuals unrelated to the householder into subfamilies using IPUMS family interrelationship variables and recalculate poverty estimates for these individuals. We show that poverty estimates do not significantly change as a result. However, there are subgroups of individuals (unrelated individuals and children) for whom inferred subfamily relationships do influence poverty rates when units similar to the official resource units are used (ORUB and ORUE). When the supplemental resource unit is used as the unit of analysis for poverty estimates (SRUB and SRUE), these differences go away. This implies that when calculating estimates using the supplemental resource unit, there is even less need to worry about the lack of information of unrelated subfamily relationships.

Individuals unrelated to the householder make up an estimated six percent of the U. S. population.[22] One dilemma in using the American Community Survey to estimate poverty is that the ACS does not include detailed family relationships for individuals unrelated to the householder. Our analysis shows that, for estimating overall poverty rates, one does not need to be very concerned about this lack of information. If one is interested in poverty estimates of individuals unrelated to the householder, particularly cohabiting partners and children, then more caution should be taken as poverty rates for these groups vary significantly by resource unit.

[22] Authors' calculations using the 2010 ACS PUMS

Next Steps

While this paper sheds light on the importance of understanding how unrelated subfamilies and changes to the unit of analysis affect poverty estimates, there is still a need for additional research on this issue. Alternative methodologies exist for grouping individuals into subfamilies. Comparing these methodologies with IPUMS family interrelationships to understand what happens to poverty rates under differing family relationship assumptions would be valuable. A comparison of the IPUMS inferred family relationship data in ACS with the explicit CPS ASEC family interrelationship data would be a worthy contribution to this work as well.

Future research should also expand this analysis by incorporating the SPM thresholds to understand what happens to poverty estimates when using the SPM resource unit in coordination with its respective thresholds. Understanding the characteristics among those families whose poverty status changes as opposed to those for whom it does not should be analyzed. While this paper provides an overview of the effect of shifting resource units, the above suggestions are logical next steps in this area of research and provide a roadmap for fully understanding how family configuration influences poverty estimates.

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Table 1. Resource Unit Definitions

Name	Definition
Official Resource Unit Basic (ORUB)	The primary resource unit includes all individuals related to the householder by marriage, blood, or adoption. Unrelated individuals aged 15 and over are considered their own resource unit and their poverty status is calculated based on their personal income. Unrelated individuals under age 15 are excluded from poverty estimates.
Official Resource Unit Expanded (ORUE)	The primary resource unit includes all individuals related to the householder by marriage, blood, or adoption. Unrelated individuals aged 15 and over are grouped into unrelated subfamily resource units based on IPUMS family relationship variables. Poverty is calculated for unrelated individuals under age 15 who are included in an unrelated subfamily via the IPUMS relationship variables. Those unrelated individuals under age 15 who are not attached to an unrelated subfamily resource unit are excluded from poverty estimates.
Supplemental Resource Unit Basic (SRUB)	The primary resource unit includes all those in ORUB, plus cohabiting partners of householders, unrelated individuals under age 15, and foster children under age 22. Other unrelated individuals aged 15 and over are considered their own resource unit; their poverty status is calcuated based on their personal income.
Supplemental Resource Unit Expanded (SRUE)	The primary resource unit includes all those in ORUE, plus cohabiting partners of householders, all unrelated individuals under age 15 who were excluded in ORUE. In other words, if an unrelated individual under age 15 is attached to an unrelated subfamily resource unit via IPUMS relationship variables, their poverty is calculated using the unrelated subfamily resource unit's total income. If an unrelated individual under age 15 is not attached to an unrelated subfamily, they are included in the primary resource unit for calculating poverty.

Table 2. Number and Percent of Persons by Relationship to Householder, United States, 2010

	Estimated Total Population	(%)	Estimated Population Under Age 18	(%)	Estimated Population Under Age 15	(%)
Related						
Householder	114,568	38.0	24	0.0	0	0.0
Spouse	55,685	18.5	6	0.0	0	0.0
Biological child	86,391	28.7	61,558	83.3	51,155	83.5
Adopted child	2,213	0.7	1,590	2.2	1,286	2.1
Stepchild	3,604	1.2	2,339	3.2	1,663	2.7
Sibling of householder	3,809	1.3	312	0.4	177	0.3
Parent of householder	3,775	1.3	0	0.0	0	0.0
Grandchild	6,752	2.2	5,375	7.3	4,812	7.9
Parent-in-law	949	0.3	0	0.0	0	0.0
Child-in-law	1,209	0.4	21	0.0	0	0.0
Other relative	5,064	1.7	1,461	2.0	1,202	2.0
Related subtotal	284,019	94.2	72,686	98.3	60,295	98.5
Unrelated						
Roomer/boarder	1,602	0.5	94	0.1	71	0.1
Housemate/roommate	5,565	1.9	37	0.1	0	0.0
Unmarried partner	6,789	2.3	7	0.0	0	0.0
Foster child	266	0.1	242	0.3	189	0.3
Other nonrelative	3,123	1.0	845	1.1	678	1.1
Unrelated subtotal	17,345	5.8	1,225	1.7	938	1.5
Total	301,362	100.0	73,911	100.0	61,232	100.0

Notes: Numbers are in thousands. Details may not sum to totals due to rounding.

Source: Authors' calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf.

Table 3. Number and Percent of Persons in Poverty Using Four Resource Unit Definitions and the Official Poverty Threshold by Demographic Group, United States, 2010

	ORUB			ORUE			SRUB			SRUE		
	Number	Percent	s.e. of (%)	Number	Percent	s.e. of (%)	Number	Percent	s.e. of (%)	Number	Percent	s.e. of (%)
Total Population (for whom poverty is	300,425	15.0	(0.039)	301,015	15.1	(0.040)	301,362	14.0	(0.037) *	301,362	14.0	(0.037) *
Unrelated to Householder (for whom	16,407	37.6	(0.164)	16,997	38.5	(0.163) *	17,345	29.5	(0.154) *	17,345	29.8	(0.162) *
Adults (for whom poverty is determined)												
Adults Aged 18 to 64	188,567	13.9	(0.039)	188,567	13.9	(0.039)	188,567	12.8	(0.037) *	188,567	12.8	(0.037) *
Males	92,453	12.2	(0.044)	92,453	12.2	(0.044)	92,453	11.4	(0.040) *	92,453	11.4	(0.040) *
Females	96,114	15.6	(0.051)	96,113	15.6	(0.050)	96,114	14.1	(0.047) *	96,114	14.1	(0.047) *
Adults Aged 65 and Over	38,885	8.8	(0.055)	38,885	8.8	(0.055)	38,885	8.6	(0.052) *	38,885	8.6	(0.052) *
Males	16,933	6.6	(0.061)	16,933	6.6	(0.061)	16,933	6.4	(0.058) *	16,933	6.4	(0.058) *
Females	21,952	10.5	(0.072)	21,952	10.5	(0.072)	21,952	10.3	(0.072) *	21,952	10.3	(0.071) *
Cohabiting Partners of Householder (Aged 15 +)	6,789	31.9	(0.218)	6,789	32.4	(0.223)	6,789	13.3	(0.157) *	6,789	13.3	(0.159) *
Male	3,478	26.7	(0.308)	3,478	26.9	(0.309)	3,478	14.6	(0.228) *	3,478	14.6	(0.231) *
Female	3,311	37.4	(0.330)	3,311	38.2	(0.327)	3,311	11.9	(0.214) *	3,311	11.9	(0.215) *
Children (for whom poverty is determined)												
Age 17 and under	72,973	21.0	(0.084)	73,563	21.4	(0.086) *	73,911	20.0	(0.077) *	73,911	20.1	(0.078) *
Age 15 to 17	12,678	15.9	(0.123)	12,678	16.3	(0.125) *	12,678	15.4	(0.121) *	12,678	15.6	(0.124)
Age 14 and under	60,295	22.1	(0.090)	60,885	22.4	(0.091) *	61,232	20.9	(0.084) *	61,232	21.0	(0.084) *
Age 14 and under; unrelated to hholder	n/a	n/a	n/a	590	55.1	(1.011)	937	23.9	(0.876) *	937	31.1	(0.848) *

Notes: Numbers are in thousands. Details may not sum to totals due to rounding. Standard errors obtained using replicate weights. All *s are statistically significant at the 5 percent level when compared to ORUB, except for age 14 and under unrelated to the householder. In this case, SRUB and SRUE compare to ORUE.

Source: Authors calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/); Minnesota Population Center, 2010 American Community Survey Integrated Public Use Microdata Sample (http://usa.ipums.org/usa/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf

Table 4. Number and Percent of Persons Experiencing a Change in Poverty Status As a Result of Change in Resource Unit Definition from the Official Resource Unit Basic (ORUB), United States, 2010

	ORUE			SRUB			SRUE		
	Number	Percent Change	s.e. of (%)	Number	Percent Change	s.e. of (%)	Number	Percent Change	s.e. of (%)
Total Population (for whom poverty is determined)	301,015	0.1	(0.002) *	301,362	1.3	(0.013) *	301,362	1.3	(0.013) *
Unrelated to Householder (for whom poverty is determined)	16,997	1.1	(0.036) *	17,345	9.1	(0.086) *	17,345	9.9	(0.094) *
Adults (for whom poverty is determined)									
Adults Aged 18 to 64	188,567	0.1	(0.003) *	188,567	1.4	(0.013) *	188,567	1.5	(0.014) *
Males	92,453	0.0	(0.003) *	92,453	1.1	(0.014) *	92,453	1.1	(0.014) *
Females	96,114	0.1	(0.005) *	96,114	1.7	(0.019) *	96,114	1.8	(0.020) *
Adults Aged 65 and Over	38,885	0.0	(0.002) *	38,885	0.3	(0.009) *	38,885	0.3	(0.010) *
Males	16,933	0.0	(0.004) *	16,933	0.3	(0.014) *	16,933	0.3	(0.015) *
Females	21,952	0.0	(0.002) *	21,952	0.3	(0.011) *	21,952	0.3	(0.011) *
Cohabiting Partners of Householder	6,789	0.5	(0.033) *	6,789	23.0	(0.200) *	6,789	22.9	(0.201) *
Male	3,478	0.1	(0.025) *	3,478	18.6	(0.237) *	3,478	18.5	(0.236) *
Female	3,311	0.9	(0.065) *	3,311	27.6	(0.003) *	3,311	27.6	(0.321) *
Children (for whom poverty is determined)									
Age 17 and under	73,563	0.1	(0.004) *	73,911	1.4	(0.029) *	73,911	1.5	(0.029) *
Age 15 to 17	12,678	0.4	(0.022) *	12,678	0.9	(0.036) *	12,678	1.1	(0.038) *
Age 14 and under	60,885	0.0	n/a	61,232	1.6	(0.032) *	61,232	1.6	(0.031) *
Age 14 and under; unrelated to hholder	590	n/a	n/a	937	n/a	n/a	937	n/a	n/a

Notes: Numbers are in thousands. Details may not sum to totals due to rounding. Standard errors obtained using replicate weights. All *s are significant at the 5 percent level when compared to no change in status.

Source: Authors calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/); Minnesota Population Center, 2010 American Community Survey Integrated Public Use Microdata Sample (http://usa.ipums.org/usa/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf.

Table 5. Percent of Persons in Poverty Using Four Resource Unit Definitions and the Official Poverty Threshold by State, United States, 2010

	ORUB		ORUE		SRUB			SRUE		
STATE	Percent	s.e.	Percent	s.e.	Percent	s.e.		Percent	s.e.	
Alabama	18.9	(0.398)	19.0	(0.399)	18.2	(0.402)		18.1	(0.403)	
Alaska	10.4	(0.743)	10.4	(0.751)	8.7	(0.678)		8.7	(0.686)	
Arizona	17.2	(0.370)	17.3	(0.372)	16.2	(0.356)	*	16.2	(0.358)	*
Arkansas	18.4	(0.413)	18.5	(0.408)	17.5	(0.417)		17.4	(0.421)	
California	15.4	(0.123)	15.5	(0.126)	14.5	(0.129)	*	14.5	(0.129)	*
Colorado	12.8	(0.336)	12.9	(0.339)	11.8	(0.322)	*	11.8	(0.320)	*
Connecticut	9.6	(0.304)	9.6	(0.308)	8.8	(0.304)		8.8	(0.306)	
Delaware	11.8	(0.758)	11.9	(0.760)	10.6	(0.711)		10.6	(0.709)	
District of Columbia	18.6	(0.940)	18.6	(0.935)	17.2	(0.976)		17.2	(0.971)	
Florida	16.2	(0.159)	16.3	(0.156)	15.1	(0.163)	*	15.1	(0.163)	*
Georgia	17.6	(0.264)	17.7	(0.268)	16.9	(0.274)		16.9	(0.268)	
Hawaii	9.7	(0.518)	9.8	(0.526)	8.8	(0.543)		8.8	(0.546)	
Idaho	15.0	(0.513)	15.0	(0.511)	14.0	(0.503)		13.9	(0.503)	
Illinois	13.7	(0.188)	13.8	(0.190)	12.7	(0.189)	*	12.7	(0.192)	*
Indiana	15.0	(0.279)	15.2	(0.282)	13.8	(0.272)	*	13.9	(0.272)	*
Iowa	12.4	(0.419)	12.5	(0.416)	11.2	(0.407)	*	11.3	(0.401)	*
Kansas	12.9	(0.423)	12.9	(0.417)	11.9	(0.400)		11.9	(0.395)	
Kentucky	18.3	(0.320)	18.5	(0.324)	17.3	(0.334)	*	17.4	(0.335)	*
Louisiana	18.2	(0.306)	18.4	(0.310)	16.9	(0.311)	*	17.0	(0.313)	*
Maine	13.3	(0.593)	13.4	(0.586)	11.9	(0.576)		11.9	(0.568)	
Maryland	9.8	(0.257)	9.9	(0.259)	9.1	(0.244)	*	9.1	(0.246)	
Massachusetts	11.0	(0.267)	11.1	(0.271)	10.1	(0.251)	*	10.1	(0.259)	*
Michigan	16.1	(0.234)	16.3	(0.234)	15.3	(0.237)	*	15.3	(0.237)	*
Minnesota	11.0	(0.313)	11.1	(0.318)	10.0	(0.317)	*	10.0	(0.320)	*
Mississippi	22.0	(0.521)	22.2	(0.524)	20.9	(0.510)		20.9	(0.512)	

Note: Table 5 continued on the next page. Standard errors obtained using replicate weights. All *s show statistically significant differences at the 5 percent level between ORUB and the corresponding resource unit.

Source: Authors' calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf.

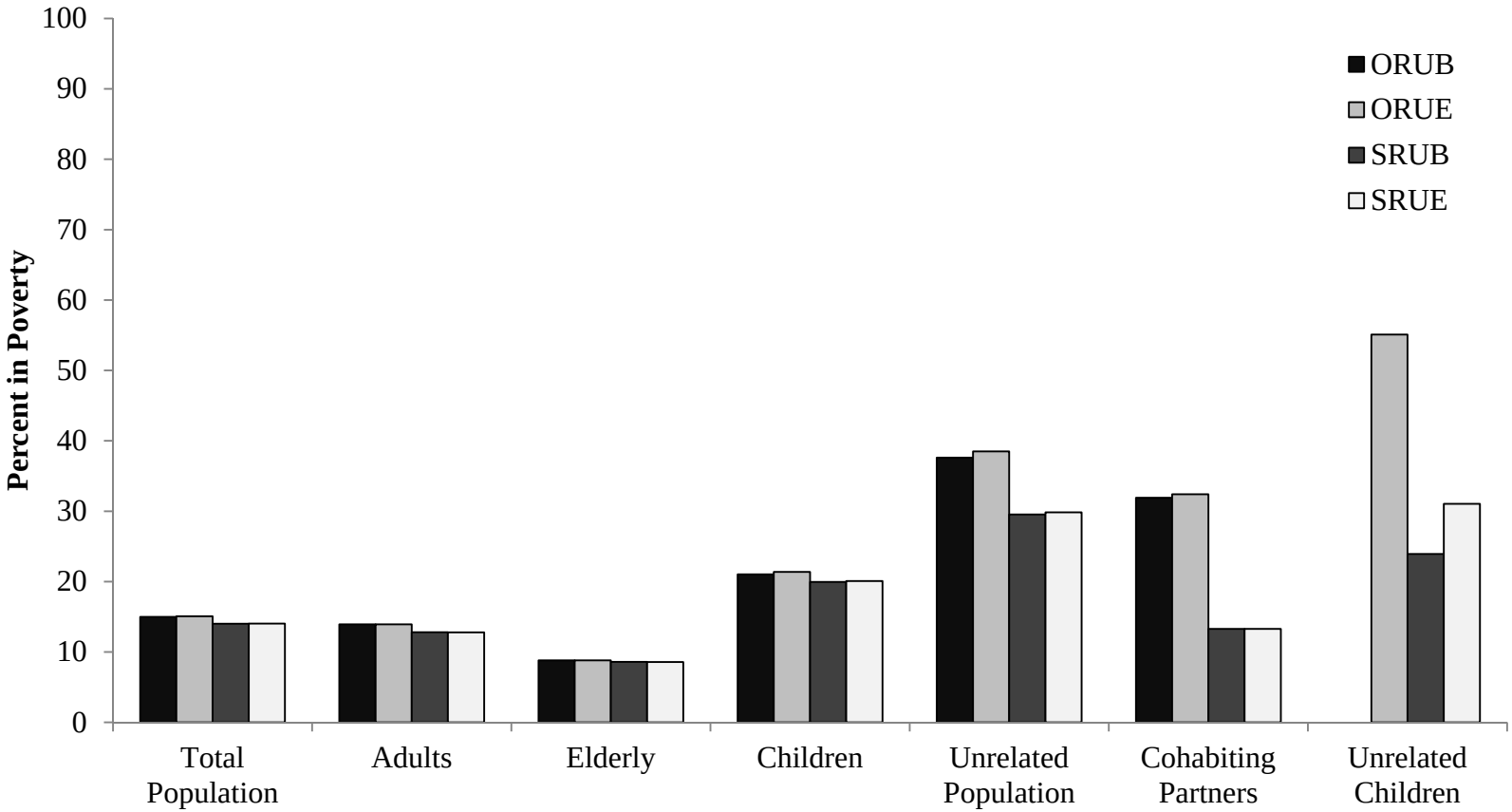
Table 5. Percent of Persons in Poverty Using Four Resource Unit Definitions and the Official Poverty Threshold by State, United States, 2010 (continued)

	ORUB		ORUE		SRUB			SRUE		
STATE	Percent	s.e.	Percent	s.e.	Percent	s.e.		Percent	s.e.	
Missouri	15.2	(0.268)	15.4	(0.271)	14.3	(0.276)	*	14.4	(0.277)	*
Montana	14.0	(0.700)	14.1	(0.699)	13.1	(0.714)		13.1	(0.715)	
Nebraska	12.8	(0.565)	12.8	(0.559)	12.0	(0.542)		11.9	(0.532)	
Nevada	14.9	(0.493)	14.9	(0.485)	13.5	(0.489)	*	13.4	(0.489)	*
New Hampshire	8.0	(0.435)	8.1	(0.435)	6.8	(0.409)	*	6.8	(0.406)	*
New Jersey	9.9	(0.225)	9.9	(0.226)	9.1	(0.210)	*	9.1	(0.211)	*
New Mexico	20.0	(0.644)	20.0	(0.644)	18.4	(0.660)		18.4	(0.662)	
New York	14.6	(0.193)	14.7	(0.194)	13.7	(0.193)	*	13.7	(0.190)	*
North Carolina	17.0	(0.237)	17.2	(0.234)	16.2	(0.241)	*	16.2	(0.237)	*
North Dakota	11.9	(0.815)	12.0	(0.819)	11.2	(0.817)		11.2	(0.820)	
Ohio	15.6	(0.206)	15.8	(0.205)	14.6	(0.202)	*	14.7	(0.199)	*
Oklahoma	16.8	(0.396)	16.9	(0.400)	15.9	(0.411)		15.9	(0.406)	
Oregon	15.3	(0.331)	15.4	(0.330)	14.0	(0.354)	*	13.9	(0.354)	*
Pennsylvania	13.0	(0.179)	13.1	(0.182)	12.0	(0.184)	*	12.0	(0.184)	*
Rhode Island	14.4	(0.611)	14.4	(0.607)	13.1	(0.572)		13.0	(0.573)	
South Carolina	17.9	(0.331)	18.0	(0.332)	16.9	(0.327)	*	16.9	(0.330)	*
South Dakota	14.1	(0.930)	14.4	(0.925)	12.9	(0.932)		12.9	(0.930)	
Tennessee	17.3	(0.294)	17.4	(0.292)	16.4	(0.303)	*	16.4	(0.303)	*
Texas	17.5	(0.157)	17.6	(0.156)	16.6	(0.151)	*	16.6	(0.152)	*
Utah	13.1	(0.459)	13.1	(0.462)	12.4	(0.452)		12.4	(0.456)	
Vermont	11.4	(0.784)	11.7	(0.823)	10.0	(0.777)		10.0	(0.778)	
Virginia	11.1	(0.178)	11.1	(0.178)	10.3	(0.174)	*	10.3	(0.172)	*
Washington	13.1	(0.257)	13.2	(0.259)	12.0	(0.273)	*	12.0	(0.274)	*
West Virginia	18.1	(0.536)	18.3	(0.551)	16.8	(0.545)		16.9	(0.545)	
Wisconsin	12.8	(0.304)	12.9	(0.299)	11.6	(0.308)	*	11.6	(0.307)	*
Wyoming	10.4	(0.816)	10.3	(0.808)	9.3	(0.761)		9.3	(0.754)	

Note: Standard errors obtained using replicate weights. All *s show statistically significant differences at the 5 percent level between ORUB and the corresponding resource unit.

Source: Authors' calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf.

Figure 1. Percent of Persons in Poverty Using the Four Resource Unit Definitions and the Official Poverty Thresholds by Demographic Group, United States, 2010



Source: Authors calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/); Minnesota Population Center, 2010 American Community Survey Integrated Public Use Microdata Sample (http://usa.ipums.org/usa/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf.

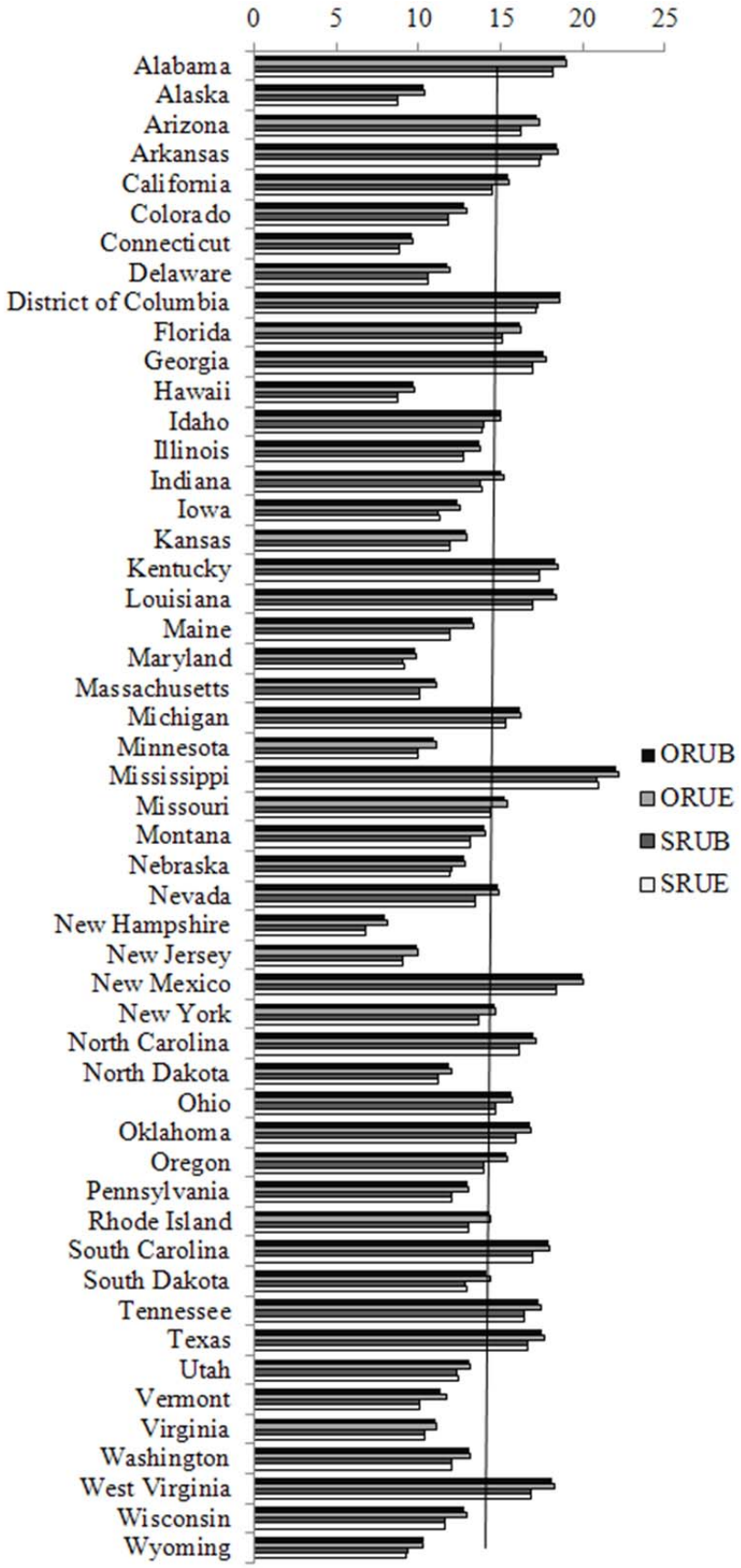


Figure 2. Percent of Persons in Poverty Using Four Resource Unit Definitions and the Official Poverty Threshold by State, United States, 2010

Source: Authors calculations – U.S. Census Bureau, 2010 American Community Survey Public Use Microdata Sample (http://www.census.gov/acs/www/data_documentation/pums_data/); Minnesota Population Center, 2010 American Community Survey Integrated Public Use Microdata Sample (http://usa.ipums.org/usa/). For information on sampling and estimation methods, confidentiality protection, and sampling and nonsampling errors, see *PUMS Accuracy of Data (2010)* available at http://www.census.gov/acs/www/Downloads/data_documentation/pums/Accuracy/2010AccuracyPUMS.pdf.