Setting and Updating Modern Poverty Thresholds

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ABSTRACT
This research compares median-based thresholds with ones based on the 33rd percentile using Consumer Expenditure Interview Survey (CE) data from 2004 quarter one through 2009 quarter one. Thresholds for reference families are produced using two different approaches: (1) calculating the thresholds based on the expenditure records of reference families composed of two adults with two children; and (2) calculating the thresholds using expenditures from all consumer units participating in the CE, but first converting their expenditures into adult equivalent value using the three-parameter equivalence scale before identifying the median and percentile values. Different updating mechanisms examined include: (1) an annual recalculation of the 33rd percentile of the reference family's outlays on FCSU, and (2) changes in the reference family's median spending or consumption based on needs. Thresholds, based on spending and consumption concepts to value needs for food, clothing, shelter, and utilities (FCSU), are produced.

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Introduction

Determining whether someone is poor is conceptually simple. The poor are those individuals whose economic resources are insufficient to meet a socially determined level of need. However, determining the level of need is complicated, with choices to be made -- choices regarding what to include in the needs measure, how to set the threshold, and how to update the threshold. Each choice involves subjective judgment. The same is true of resources but less so since once the decisions regarding the threshold are made, a measure of resources that is consistent conceptually with the threshold follows.

As is well known by now, in 1995, the National Academy of Science (NAS) Panel on Poverty Measurement and Family Assistance issued their report calling for revisions in the US official poverty measure. They made recommendations regarding how to determine the threshold and how to define an appropriate resource measure. In 2004 the NAS held a Workshop to review the research conducted since the report's release.

Since the release of NAS report, many of the Panel's recommendations have been questioned and tested. Attention has been placed on the study of: child care (see Short 2009, 2010); medical care (Banthin et al. 2001; Bavier 2001; Short and Garner 2002), geographic adjustment (Renwick 2009) and shelter. The work on shelter began in earnest shortly after the Panel's report was published. The consumption value of owner occupied housing was included in alternative poverty measures first by Johnson, Shipp, and Garner (1997), followed by Short et al. (May 1998) and in the first Census Bureau report released on an alternative poverty measure in 1999 (Short et al. 1999) Also in the 1999 Census report, outlays or out-of-pocket (OOP) spending based thresholds were produced. Garner and Rozaklis (1999, 2001) and Rozaklis and Garner (1999) presented poverty thresholds that accounted for the rental equivalence value of owner occupied housing and the market value of subsidized rental housing. The value of subsidized housing accounted for a rise in the experimental threshold by $1 (Rozaklis and Garner 1999). In 2005, Garner computed and compared thresholds based on three different definitions of shelter: CE-defined expenditures, OOP spending, and OOP spending for food, clothing, utilities, rents and maintenance and repairs for renters, and the rental equivalence value of owner occupied housing (replacing owners' shelter expenditures) for homeowners. Short (2005) used the OOP and shelter consumption based thresholds produced by Garner (2005) and created consistently defined resources measures; using this measure Short produced poverty rates. Renwick (2009, 2010) focused on resources and how to account for subsidizes for rental units in resources. In more recent work, Betson (2009) presented alternative ways to account for the consumption needs of owners without mortgages and renters living in subsidized housing using regression methods. Garner (2009a, b) also produced thresholds using OOP spending and rental equivalence.

Beginning in 2008, conversations and meetings with Congressional staff from the Joint Economic Committee, staff within the BLS and Census Bureau and outside experts were held to learn more about the research that had been conducted on the NAS-based poverty measure. On June 17, 2009, the "Measuring American Poverty Act of 2009" was signed and introduced to the House of Representatives. From henceforth, we refer to the Act as MAP. The Act was introduced to amend title XI of the Social Security Act. According to the proposed legislation,

> ….this Act is to provide for an improved and updated method for measuring the extent to which families and individuals in the Unites states have sufficient income to allow a minimal level of consumption spending that meets their basic physical needs, including food, shelter (including utilities) clothing, and other necessary items, in order to better assess the effects of certain policies and programs in reducing the prevalence and depth of poverty, to accurately gauge the level of economic deprivation, and to improve understanding of targeting of public resources, without directly affecting the distribution of, or eligibility for, any Federal benefits or assistance. (page 3, lines 21 through page 4, lines 1-8).

The MAP specified that modern poverty thresholds are to be based on a distribution of consumption expenditures that includes food, clothing, shelter and utilities. The threshold is to be produced for a reference family with the threshold equal to 120 percent of the 33rd percentile of the distribution of FCSU consumption expenditures, or a limited band converging on this percentile. Four or more of the most recent

years of CE data, or a combination with other data, are to be used to produce the thresholds. The thresholds are to be updated no less often than annually using this method (page 6, lines 5-20).

Due to differences in the out-of-pocket expenditures of owners with and without mortgages the MAP further specifies that the calculation of the threshold "shall be made separately" for (1) families who own their primary residence and do not have a mortgage secured by the residence, and (2) all other families such that they can "purchase similar quality shelter" (page 8, lines 1-17).

In response to the MAP proposed legislation, Garner (2009a, b) produced reference family thresholds for consumer units composed of two adults and two children that accounted for differences in housing payment status as specified in the MAP. Thresholds for 2007 were produced based on the 33rd percentile of FCSU out-of-pocket expenditures with a multiplier of 1.20. Reference family thresholds were produced for: (1) all reference families; (2) reference family homeowners without mortgages (and those with no rent payment---this did not impact the thresholds as such renters are minimal); and (3) owners with mortgages plus renters with rent payments. No adjustments were made for subsidized renters in thresholds 1 or 3. The 2007 all reference person threshold was $25,179, the owners with mortgages and renters threshold was higher, $26,732, and the homeowners without mortgages threshold was $14,833. These are in contrast to an all reference family threshold based on a percentage of the median rather than the 33rd percentile; this threshold was estimated to be $25,865 for 2007.

The purposes of this paper are four:

1. to continue and extend our examination of the sensitivity of poverty thresholds to the definition of shelter
2. to examine the impact of different updating mechanisms
3. to study the change in the real value of the thresholds overtime, and
4. to examine the impact of basing the thresholds on the behavior of reference families only or on all consumer units.

Our motivation in paying particular attention to shelter is that shelter accounts for the largest single share of the threshold and this share has been increasing over time. Garner and Short (2008) reported that shelter (not including utilities) accounted for 29 percent of OOP expenditure-based threshold based on FCSU plus medical care spending in 1996 but 32.9 percent by 2005. A rough adjustment to the FCSUM threshold to remove medical care expenditures resulted in shelter accounting for 31.3 percent of FCSU thresholds in 1996 and 35.6 percent by 2005.

The updating mechanisms are based on the Panel's proposal and the MAP proposed legislation. In none of the previous research has the MAP legislation updating mechanism been tested.

The real value of thresholds over time has not been raised since the Panel first proposed these in 1992. The real value of the current official poverty threshold has not changed essentially since the threshold was first introduced. Official poverty thresholds are updated each year only by changes in the CPI.

Our motivation in producing thresholds using the behavior of reference families as opposed to all consumer units is due to the relatively small percentage of consumer units represented by the reference family. As reported by Garner and Short (2010), in 2005, a reference family composed of two adults and two children represented 8.45 percent of household types. The Panel selected this type of household unit as it represents the largest proportion of people in households with children, approximately 14 percent of the U.S. population in 2005. Since children have historically made up a large portion of the poverty population, it seemed reasonable that the selected reference family would represent spending patterns for families with children.

While the definition of a family's resources should be made consistent with any concept of need, this paper is limited to presenting various choices in setting and updating the concept of economic need or poverty threshold. The paper highlights the methods used to produce thresholds and addresses some advantages and disadvantages; however, it does not suggest a specific choice as optimal. In addition, the paper does not

present differences in the choices in terms of the percentage of people who are poor. To do that, consistent resources measures would need to be developed, and the development of the resource measures is beyond the scope of this research.

Background

The official U.S. poverty measure follows the logic of comparing economic resources to a threshold representing needs and is based on subjective judgment. The current poverty measure's concept of needs (expressed in the poverty threshold) reflects the cost of a nutritionally adequate basket of food commodities multiplied by three. These thresholds reflect the empirical observation that in the 1960's the average family, with children, spent roughly one-third of their budget on food. Since their inception, these thresholds have been annually updated to maintain their real purchasing power by inflating their nominal value by the CPI-U. The current poverty measure utilizes a concept of available resources that reflects the before tax post transfer income of a family.

The Panel's new approach to poverty measurement did not abandon the logic of the current methodology but made fundamental departures from how needs and resources are defined. In their evaluation of the current official measure, the Panel concluded that while the current official approach may have been adequate for poverty measurement in the 1960's, it is inadequate to determine who is poor in today's society. While the poor may have, in large part, been exempt from taxation, today they face a significant tax burden from payroll taxes. While the poor in the 1960's may have receive the majority of assistance in the form of means tested assistance programs, assistance today is provided through in-kind assistance programs or through the tax system in the form of refundable tax credits. With more mothers entering the work force, ignoring work related expenses and in particular child-care expenses became a significant problem. By focusing solely upon pre-tax post-transfer cash income, The Panel concluded that the actual available resources to meet the family's needs are being misrepresented with the currently official poverty measure.

While many concerns have been raised about the current measure's concept of resources, the adequacy of the poverty threshold to reflect a family's needed outlays in today's society has also been a concern. The real value of the thresholds has not increased since they were first adopted. The Panel voiced concern that the thresholds were out of step with today's society and called for a uniquely new approach to how to set the thresholds. The Panel called for abandoning the approach of setting needs based upon what nutritional experts considered appropriate consumption levels for food and relying upon a large multiplier (3.0) to capture other needs of the family. The approach favored by the Panel was to base the choice of the poverty threshold on the spending patterns of people living in the U.S. on a core group of necessities and then to use a relatively small multiplier to capture the other non-medical and non work related needs of the family.

In the Panel's report, recommendations 2.1-2.4 state that a poverty threshold with which to initiate a new series of official U.S. poverty statistics should be derived from Consumer Expenditure Survey data for a reference family of four persons (two adults and two children). The basic bundle was defined to include food, clothing, shelter and utilities (FCSU). A percentage of the median, plus a multiplier to account for other basic needs, would to be applied to derive the threshold. The needs of other families would be derived using an equivalence scale. The threshold was to be updated each year based on changes in median spending on the core group of necessities. Updating of the threshold would be made according to changes in median FCSU expenditures. This updating would allow for changes in the real changes in the consumption of the bundle of necessities (see Citro and Michael 1995).

This method has been used within BLS (under the umbrella of a memorandum of understanding for research on a NAS-based poverty measure by Garner and Short) to produce thresholds that have been used by the Census Bureau since 2005. From 2000 to 2005, the thresholds were produced as part of joint research conducted by Garner and Short, on-site at the BLS. In 1999, the 1998 NAS-based thresholds were produced at BLS by Garner for the Census Bureau under a contract between the BLS and Census Bureau. The most recent research NAS thresholds, based on CE data, can be found on the Census Bureau web site: http://www.census.gov/hhes/www/povmeas/tables.html.

The first series of NAS-based thresholds introduced used Consumer Expenditure Survey (CE) defined expenditures (see BSL 2010); for this definition, owner shelter expenditures did not include principal payments. Another series was introduced in 2008 that added mortgage principal payments to owners' shelter expenditures and thus were based on outlays or out-of-pocket or outlay (OOP) expenditures (see Rogers and Gray, 1994). Consistently defined thresholds, using the OOP definition of FCSU expenditures were produced by Garner (2005), and resources (Short (2005) were produced for the American Statistical Meetings in 2005, and later updated for a BLS working paper (Garner and Short 2008). That work has subsequently been accepted for publication in the *Review of income and* Wealth (Garner and Short 2010).

In the Panel's production of an alternative poverty threshold, and in the first series of CE-based research thresholds used by the Census Bureau, the CE-defined definition of food, clothing, shelter, and utilities expenditures was used to produce the threshold. By using the CE-defined definitions, the Panel was implicitly assuming that spending equaled what it would cost to attain the core consumption bundle. While expenditures for food, clothing, and utilities are fair approximations of the costs to meet one's consumption needs, expenditures for shelter are not. The consumption value of non-market shelter, such as owner occupied housing, subsidized rental housing, and rent controlled housing, is undervalued by spending. The Panel acknowledged this problem but did produce a measure to account for this in their report. [1]

Methods and Procedures

As stated earlier, the purposes of this paper are four:

1. to continue and extend our examination of the sensitivity of poverty thresholds to the definition of shelter
2. to examine the impact of different updating mechanisms
3. to study the change in the real value of the thresholds overtime, and
4. to examine the impact of basing the thresholds on the behavior of reference families only or on all consumer units.

The following sections provide details regarding the methods employed in this research.

Impact of Changes in Shelter Definitions

Both spending and consumption underlie the official and NAS recommended thresholds. The official thresholds and the NAS thresholds presented in the Panel's report are based on spending, yet both are assumed to reflect needed consumption (e.g., Citro and Michael, 1995, pp. 1, 4, 148). Thus, both spending and consumption based thresholds are presented. Thresholds are produced for five definitions of shelter. Shelter is defined as:

1. CE-defined expenditures for all reference families (CE),
2. CE outlays or out-of-pocket OOP expenditures for all reference families (OOP),
3. CE OOP expenditures for reference families who are owners with mortgages or paying market rent only (OOP-Drop),
4. CE OOP expenditures for all reference families with adjustments for reference families who are owners with mortgages or who pay market rent (OOP-Adjust), and
5. CE OOP expenditures for renters paying market rent, imputed market rent for renters receiving housing subsidies, and rental equivalence valuations for owners (Consumption).

Details regarding each definition and implementation in a threshold are presented later in the paper.

[1] The Panel noted that using the CE definition of shelter for owner-occupied housing was for "processing convenience; a preferable definition would include actual outlays for mortgage payments, taxes, insurance, and maintenance and repairs, together with an imputed amount for the estimated rental value of the home net of such out outlays" (Citro and Michael 1995, p. 148). For the threshold measure, the Panel's recommendation is equivalent to replacing shelter expenditure for owners-occupiers in the thresholds with the implicit rent of this shelter (Garner 2005).

Threshold Specification

In the NAS report, the Panel recommended that the poverty threshold should reflect what families of four (two adults and two children), living in the United States, spend on food, clothing, shelter and utilities (FCSU). Specifically the Panel stated that the poverty threshold should be set so that the amount of spending on these necessities would reflect 78 percent to 83 percent of median spending on food, clothing, shelter, and utilities (FCSU) by the reference family. The Panel preferred the use of percentiles of the median so that changes below the median will not affect the poverty rate. The percentages chosen by the Panel corresponded to 30th and 35th percentiles of the FCSU spending distribution in 1992 using Bureau of Labor Statistics (BLS) Consumer Expenditures Survey (CE) data. Garner (2005) reported that these percentages remained relatively stable from 1993 to 2003; however, when the shelter definition changed to reflect the rental equivalence of homeowners, the percentages corresponding to the 30th the 33rd percentiles were higher. To account for other needed goods (non-medical and non-work related needs), the Panel recommended that a multiplier between 1.15 and 1.25 would be applied to choice of spending needs on FCSU. Once the poverty threshold for the reference family was set then the thresholds would be updated by changes in the median spending by families of four on the core necessities of FCSU. The equation used for the Census Bureau CE-defined FCSU thresholds is below:

$$BLS\ Threshold = \frac{(1.15 * 0.78 * Median) + (1.25 * 0.83 * Median)}{2} \quad (1)$$

Updates to the threshold have been made to reflect changes in median FCSU expenditures. The assumption is that the percentages of the median are held constant at the values that were used by the Panel for the 1992 thresholds presented in the NAS report.

According to the MAP, the threshold would be determined using the following equation:

$$MAP\ Threshold = 1.20 * 33rd\ percentile \quad (2)$$

Updated to the threshold would be made by re-estimating the 33rd percentile of FCSU expenditures each year using.

For this study, we use equation (2) to specify the initial threshold and then using two different methods to update the thresholds: (1) by changes in the median, and (2) by re-estimating the 33rd percentile each year.

Updating and Different Samples

In order to study the impact of different updating mechanisms and different samples, four sets of thresholds were produced. The first two sets were based on the behavior of reference families and the second two were based on the behavior of all consumer units, with an equivalence scale adjustment to reflect reference family thresholds. For both reference family-based thresholds and all consumer unit-based thresholds, thresholds were updated by changes in the median and also by changes in the 33rd percentile of FCSU expenditures. See below.

1. Reference family based thresholds
    a. Updated by changes in the median
    b. Updated by changes in the 33rd percentile
2. All consumer unit based thresholds
    a. Updated by changes in the median
    b. Updated by changes in the 33rd percentile

Changes in Real Consumption Over Time

The NAS Panel noted that the current official poverty thresholds had not been updated for real growth in consumption, only price change since 1965, with a few minor exceptions. The Panel stated that new thresholds were needed that reflect changes in spending needs. (See Citro and Michael, 1995). In the 1995 report, the Panel recommended a procedure to calculate poverty thresholds that would, by design, be updated on a continuous basis and would reflect changes in levels of living over time that are relevant to a

poverty budget rather than for changes in total expenditures. There was broad agreement at the 2004 NAS Workshop that the Panel's quasi-relative approach for annually updating the thresholds continue. The Panel's original recommendation was that the most recent three years of CE data be used, with earlier years' data updated to current dollars. This approach would allow for "…changes in real consumption but in a conservative manner" (Citro and Michael, 1995, p. 154). The three-year approach was recommended to increase the sample size and also to smooth out year-to-year changes in the thresholds.[2] Using three years of data however produces thresholds that lag somewhat behind changes in real consumption. Yet, such thresholds are more reflective of current consumption that the official threshold that is updated by the CPI-U.

We followed the NAS recommendation to use 3 years of CE data for setting and annually updating the thresholds. We produced a series of thresholds for each of the five spending concepts listed earlier. We initially set the threshold by using the twelve quarters of data – quarter one 2004 through quarter four 2006. For each spending concept, we determined the 33rd percentile of FCSU spending and set the initial threshold at 120 percent of this amount. For the next time period, quarter two 2004 through quarter one 2007, we computed the median of FCSU spending for reference families then adjusted the threshold by the ratio of the current median relative to the median in the base period quarter one 2004 through quarter four 2006). This quarterly updating continued until the last twelve quarter period contained in our data –quarter two 2006 through quarter one 2009. In all we were able to construct a quarterly series for each spending concept containing ten observations. This resulted in annual thresholds for 2006, 2007, and 2008 and for intervening periods between the threshold years. This series of thresholds enabled us to examine the impact of changes in expenditures, and methods introduced into the CE Interview data by the BLS.

See below for the data series used to create each threshold:

1.	2004 quarter 1 through 2006 quarter 4	
2.	**2004 quarter 2 through 2007 quarter 1**	**2006 Annual Threshold**
3.	2004 quarter 3 through 2007 quarter 2	
4.	2004 quarter 4 through 2007 quarter 3	
5.	2005 quarter 1 through 2007 quarter 4	
6.	**2005 quarter 2 through 2008 quarter 1**	**2007 Annual Threshold**
7.	2005 quarter 3 through 2008 quarter 2	
8.	2005 quarter 4 through 2008 quarter 3	
9.	2006 quarter 1 through 2008 quarter 4	
10.	**2006 quarter 2 through 2009 quarter 1**	**2008 Annual Threshold**

Series 2 represents the 2006 annual threshold, series 6 represents the 2007 threshold, and series 10 represents the 2008 threshold.

In this study, we examine how thresholds reflect changes in real growth in consumption over time. To do this we converted values for FCSU into December 2006 dollars. As a result of this adjustment, thresholds from this study are not comparable to those presented in previous work.

The Reference Family

Another area of research has focused on the equivalence scale applied to produce thresholds for non-reference families. The Panel recommended using a two-parameter equivalence scale; however, at a 2004 NAS Workshop on poverty measurement, consensus was reached that a three-parameter scale, that accounts for the differences in two-parent and single-parent households, better approximates spending and consumption needs in the U.S. The three-parameter scale was applied in this research.

Thresholds were produced for a reference family. For this study, a reference family is defined to include two adults and two children; these individuals do not need to be related. This definition of the reference

[2] As noted in the Panel's report (Citro and Michael 1995, p. 147), "For actual use in updating the reference family poverty threshold, however, we believe it would be preferable to aggregate quarterly amounts for those units with complete data, making an appropriate adjustment to the weights to account for other units."

family is like a consumer unit as defined by the Bureau of Labor Statistics (BLS) for the CE data. In the Panel's report and much of the NAS-based poverty work prior to 2009, the reference family was defined as two married adults with related children.

Details Regarding Shelter

As noted earlier, a purpose of this paper is to continue and extend our examination of the sensitivity of poverty thresholds to the definition of what constitutes the core necessities, FCSU, in particular, shelter.

1. CE-defined Expenditures

The Panel used the CE definition of shelter expenditures for its report.[3] The primary series produced on the Census Bureau web site also is based on this definition. Thus, for historical purposes, we produce thresholds based upon this definition. The CE-definition of shelter for includes:

1. Interest paid on reference families' principal residences
2. Property taxes
3. Expenses for maintenance, repairs, insurance, other expenses
4. Rents paid

The CE-definition of shelter for owners is based on the old method used to value homeowner shelter for the Consumer Price Index (CPI) prior to 1983. That method reflected the purchasing and financing costs of base-period homebuyers and operating expenses of all base-period homeowners. The old method failed to distinguish the investment aspect of home owning from the consumption aspect. In 1983, the BLS change the way that the CPI for All Urban Consumers (CPI-U) had been measured to account for consumption costs. Shelter spending was replaced by rental equivalence (BLS 1983).

For a CE-defined expenditures threshold, no additions would be added to resources for housing subsidies or the implicit net rental income for homeowners.

2. Outlays or Out-of-pocket (OOP) Expenditures

An OOP alternative definition of shelter spending was first produced by Garner and Short (2001) and again by Garner (2005) and Garner and Short (2008, 2010) to account for all shelter spending by reference families. The only difference between CE-defined shelter expenditures and OOP expenditures is that mortgage principal payments are now included. The reason these payments have been added for the poverty threshold is that once a commitment to live in a mortgaged housing unit is made, such payments are not discretionary and must be paid by the homeowner to live there (Garner and Short 2008, 2010). Thus the CE-OOP definition of shelter includes:

1. Mortgage interest payments
2. Interest paid on reference families' principal residences
3. Property taxes
4. Expenses for maintenance, repairs, insurance, other expenses
5. Rents paid

[3] Betson, in a recent manuscript (Betson 2009) and a member of the NAS Panel, noted, "The reason for using the expenditure perspective on shelter expenses is perhaps historical. The BLS provided tabulations of the 1989 to 1991 CE data for use in the Panel's report that only included mortgage interest (principal was not included). I don't recall any discussion by the Panel on this point but clearly the Panel didn't directly ask for the principal payments to be included either. Consequently, the Census has since then routinely utilized the threshold based up on the exclusion of principal payments in their reports," (p. 12). Danziger, as a discussant at the 2010 ASSA meetings and also a member of the NAS Panel, also acknowledged that he could not remember any discussion of how shelter was defined in the measure that the Panel produced. In a 1995 manuscript, Betson referred explicitly to mortgage principal payments as being part of the shelter expenditures of owners with mortgages (see footnote 2 and see page 3).

The outlays or OOP concept gained support as a preferred measure to the CE definition with the housing crisis and increases in homeownership home mortgages. In 1992, homeowners represented 61 percent of all consumer units, by 2005 they represented 67 percent and by 2008, 66 percent. Homeowners with mortgages increased from 59 percent in 1992 to 63 percent in 2005 and 64 percent in 2008. Four-person consumer units have much higher rates of homeownership and mortgage holdings than all consumer units on average: in 1992, 72 of all four-person consumer units were home owners and 83 of these held mortgages; in 2005, 74 person were homeowners and 87 of these had mortgages; by 2008, homeownership rates rose to 75 percent but those with mortgages fell to 84 percent (BLS web site http://stats.bls.gov/cex/csxstnd.htm 2009).

Based on unpublished CE data, renters with subsidies also increased in number over the 1992 to 2008 period. They represented 3.5 percent of all consumer units (CUs) in 1992 and 3 percent of four person CUs. By 2005, 5.2 percent of all CUS living in the U.S. were receiving housing subsidies; 3.6 percent of all four-person units received subsidies. By 2008, the percentage of CUs with housing subsidies decreased among all consumer units (representing 4.9 percent of all CUs) and four-person units (representing 4.2 percent of four-person units).[4]

When thresholds are based on OOP spending, they reflect heavily the spending of homeowners with mortgages and renters not receiving housing subsidizes.

For an OOP expenditures threshold, no additions would be added to resources for housing subsidies or the implicit net rental income for homeowners.

3. OOP Drop

The OOP definition is fine if the focus is on spending needs given the current mix of renter and owner housing in the U.S. If one assumes that individuals and families choose to live in owner or renter housing, owners' needs should be the same and renter needs should be the same. The FCSU needs of owners with and without mortgages would be the same and the FCSU needs of renters in subsidized or not subsidized housing would be the same. Thus, there would be no difference in the shelter needs of owners and no differences in the shelter needs of renters. With the OOP spending approach, the shelter needs of homeowners without mortgages and rented by families receiving housing subsidizes are undervalued.

One approach to rectify this problem would be to drop reference family homeowners without mortgages and those receiving housing subsidies before determining the poverty threshold and applying the annual updating process. In this study we refer to this option as OOP-Drop. A caution with this method is that by dropping these two groups, who may have low spending on FCSU, from the determination of the poverty threshold will likely "bias" upward the poverty thresholds.

For an "OOP Drop" threshold, additions could be added to resources to equal to the implicit shelter expenditures added to the threshold for homeowners without a mortgage and for renters receiving housing subsidies.

4. OOP-Adjust

A fourth option alleviates the potential bias from dropping these families before producing the FCSU threshold. For this option, we adjust their OOP spending on FCSU to reflect levels of spending as if homeowners without a mortgage had a mortgage and subsidized renters did not receive a subsidy. We refer to this option as OOP-Adjust.

For renters receiving housing subsidies, rent regressions are estimated to impute the market value of their housing. These replace the reported rents of renters receiving subsidies in the OOP measure. The regression includes a dummy variable and interaction terms for subsidy and income. An earlier model specification, based on market rents only resulted in predicted imputed market rents for subsidized housing

[4] CE tabulations were produced by Jeffrey Crilley of the Division of Consumer Expenditure Surveys using internal BLS data, December 29, 2009.

that were less than what subsidizers renters reported in expenditures. See Tables 1-5 for results of the rent regressions that underlie our results.

Betson (2009) proposed a method to adjust homeowners FCSU expenditures to a level of FCSU that would be spent if they had mortgages. Application of this method would place all homeowners on equal footing.

To formalize how the adjustment could be made, let FCSU denote the 33rd percentile of FCSU of the reference family and *m* (.20 or 20 percent) represents the "little bit more" reflected in the threshold. Consequently, the threshold for the reference family would equal:

$$Threshold = FCSU\ (1+m) \tag{3}$$

and would represent the needed outlays for all households that rent, own their homes but have a mortgage payment, or receive a government subsidy. Families who own their homes without a mortgage will still have outlays for shelter (property taxes, maintenance, insurance and other expenses) but will not have any outlays for mortgage interest or principal. If θ is the percent of FCSU reflecting total shelter outlays and ρ is the percent of shelter outlays reflecting mortgage payments then a household that does not have a mortgage payment would need outlays equal to:

$$Threshold + Outlays\ for\ Mortgage\ Payments = FCSU\ (1+m) + \theta\,\rho\,FCSU \tag{4}$$

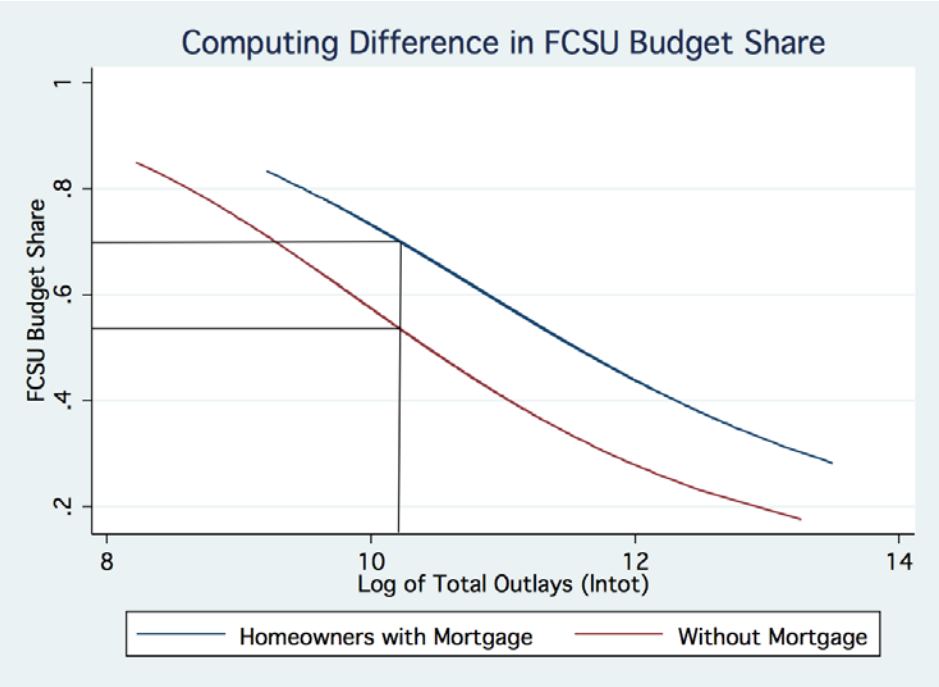
Thus, thresholds for homeowners without mortgage payments will be higher by $\theta\,\rho/(1+m)$ percent. For example, if shelter outlays are 50 percent of FCSU needed outlays, mortgage payments are 70 percent of shelter outlays, and we employ a 20 percent value for *m*, the threshold for homeowners without a mortgage should be 29.2 percent higher.

To implement this approach for this study, Betson estimated how the FCSU budget share varies with total outlays in families who own their home (with and without a mortgage). He estimated the relationship using the logistic transformation of the FCSU budget share. Betson controlled for the log of real total outlays (lntot), its square (lntot2), and a dummy variable indicating whether the unit was a homeowner without a mortgage (nomort). The sample represented all reference families who own their home (with and without a mortgage). "Nomort" is the variable indicating that the homeowner did not have a mortgage.
The regression model was run for each set of data used to produce the thresholds. Following is the result of the analysis for the 2007 threshold.

```
      Source |       SS       df       MS              Number of obs =    6294
-------------+------------------------------           F(  3,  6290) =  572.70
       Model |  764.113245     3  254.704415           Prob > F      =  0.0000
    Residual |  2797.41584  6290  .444740198           R-squared     =  0.2145
-------------+------------------------------           Adj R-squared =  0.2142
       Total |  3561.52909  6293  .565950912           Root MSE      =  .66689

------------------------------------------------------------------------------
     loddshr |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lntot |    -1.6825   .3687852    -4.56   0.000    -2.405445   -.9595551
      lntot2 |   .0479825   .0168933     2.84   0.005     .0148659    .0810992
      nomort |  -.7065383    .029568   -23.90   0.000    -.7645016    -.648575
       _cons |   13.03327   2.012272     6.48   0.000     9.088529    16.97801
------------------------------------------------------------------------------
```

The figure below illustrates how the FCSU budget share varies with total outlays for both two groups. For this study, we used the estimated budget shares to determine the difference in the budget share spent on FCSU by homeowners with and without a mortgage holding total outlays constant.



The reported amount of FCSU expenditures for homeowners without mortgages were adjusted by multiplying their reported FCSU by the ratio of the expected FCSU budget share if they had a mortgage (ω_W) to the expected FCSU budget share if they did not have a mortgage (ω_{WO}). The two expected budget shares would be computed using the estimated relationship between the FCSU budget share, total outlays and whether the family had a mortgage or not. Consequently, the family's adjusted FCSU would equal

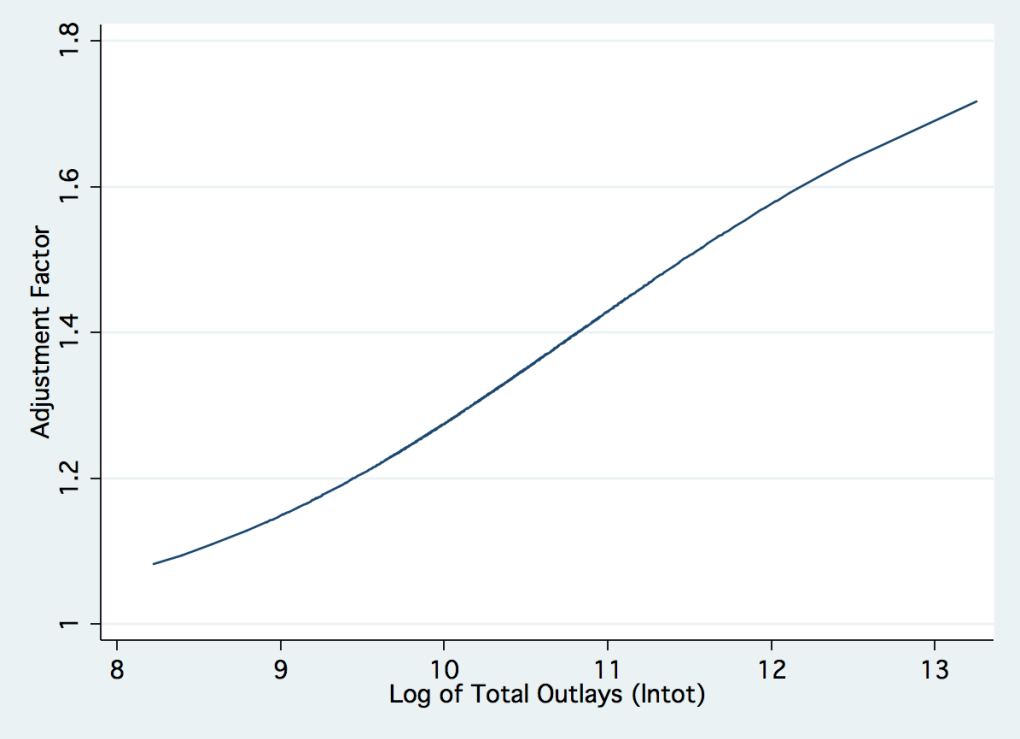
$$\frac{\omega_W}{\omega_{WO}} \times FCSU = \frac{1+\exp\left(-PV-\mu\right)}{1+\exp\left(-PV\right)} \times FCSU \qquad (5)$$

where μ is the estimated effect on the budget share of not having a mortgage (-.7065) for 2007 and

$$PV = 13.0333 - 1.6825\ lntot + .0480\ lntot2 \qquad (6)$$

where lntot and lntot2 are the log of total outlays and the square of the log of total outlays.

The adjustment factor is predicted to increase with the total outlays of the reference family. The following figure depicts the relationship between the adjustment factors that were used as a function of the family's total outlays. To be clear, the amount of FCSU that was adjusted was the family's reported outlays on FCSU.



For an OOP Adjust threshold, additions would not need to be added to resources.

5. Housing Consumption

The OOP-Drop and OOP-Adjust concepts are attempts to estimate the FCSU spending needs if all owners were assumed to be like the majority of owners and if all renters were assumed to be like all renters. However with none of the spending concepts for shelter represented by options 1-4 above are renters and homeowners treated equivalently. The OOP-Adjust for homeowners without mortgages accounts for additional spending needed for shelter with the implicit additions added to resources; however, it does not account for the fact that homeowners are both renters and owners, and thus, receive implicit net rental income from homeownership. To place both homeowners and renters an equivalent footing, economists have long stressed the use of rental equivalence for homeowners. By defining needs in terms what it would costs for the consumption of FCSU, rather than current or adjusted spending, market rental values are needed both for all owner occupied housing and rental units. For renters receiving rental subsidies, imputed rents reflect rental payments had they not received subsidies. For all owners, the reported rental equivalence is used. Rental equivalence estimates the cost of renting housing services equivalent to those provided by owner-occupied homes. (The change in these rents, represents the change in the amount that homeowners would have to pay each month to live in homes like the ones they own. The CPI-for Owner's equivalent rent reflects this change.)

By including the consumption value of shelter in FCSU, the threshold is nearer to becoming consumption-based rather than spending-based. The implicit assumption in a consumption-based threshold is that there is a basic level of consumption that is needed so as not to be poor. A consumption-based threshold would include the value of shelter services regardless of who paid for them (e.g., they could have been paid for by a person not living in the household or another entity) or if there were very low expenditures for the services (e.g., there is no mortgage and the homeowner only pays for property insurance). For a fully consumption based threshold, the value of transfers in-kind, gift received, and the home production of these goods and services for own consumption would need to be added to expenditures for food, clothing, and utilities, fairly good proxies of the value of the consumption of FCU goods and services.

The resource measure consistent with such a threshold would include the subsidy value for renters and for homeowners, the net implicit rental income from the owner-occupied housing (see Garner and Short 2009

JHE).. Implicit net rental income could be defined as the rental value of the owned shelter services minus the user costs of producing the housing services. User costs depend on interest rates, depreciation, maintenance, property taxes, insurance, capital gains, and the marginal federal income tax rate of the owner. Accrued capital gain decreases the cost of owner-occupied housing when positive. Homeowner-user costs would be expected to be lower than those of a landlord offering the same level of housing services since homeowners have additional tax advantages that landlords do not have. Garner and Verbrugge (2006) found that user costs sometimes lie above the implicit rents of owners, depending on the geographic market of the property, although in the last several years, rents have exceeded user costs. (For research on rents and user costs of homeowners, see for example, Diaz and Luengo-Prado 2008, Garner and Verbrugge 2009a,b, Verbrugge 2008, Green and Malpezzi 2003.)

See Garner and Verbrugge (2009a, b) for a comparison of estimated user costs and rental equivalence. See Garner (2005) and Garner and Short (2001) for out-of-pocket spending and consumption-based thresholds using homeowners rental equivalence.

Results

Thresholds are presented in Tables 6-9 Charts 1-4. Table 6 and 7 and Charts 1 and 2 include thresholds based on the behavior of reference families. Tables 8 and 9 and Charts 3 and 4 include thresholds for reference families but with the thresholds derived from the spending behavior of all consumer units with the conversion of FCSU values for all CUS to single-adult equivalents first using the three-parameter equivalence scale. The FCSU single-adult equivalents are ranked to obtain the 33rd percentiles and medians. These percentiles and medians are then converted to referenced family thresholds by applying the three-parameter equivalence scale to the single person adult equivalent 33rd percentiles and medians. All thresholds are presented in December 2006 U.S. dollars.

First looking at the trends over time, it is clear that the real value of consumption has increased over the time period with greater increases between 2006 and 2007 than between 2007 and 2008. This pattern holds with both updating approaches, using the median and or the 33rd percentile, and for all definitions of FCSU. The spread in thresholds over time using the different shelter definitions is greater when thresholds are updated each year by the 33rd percentile than by the median. Chart 10 shows the ratios of FCSU expenditures to the median over the time period. Unlike the Panel's thresholds and those presented in earlier work, the CE-defined ratio is closer to 82.5 percent of the median, closer to the upper range of the Panel's and earlier threshold percentages of the median, 78 percent and 83 percent. The OOP ratios are lower than the other four and are in the middle range of the Panel's suggested range from 1992. The dip in the 2007 ratio for the CE-defined measure is a reflection of the change in wording for food away from home expenditures by the CE (see Brookings presentation by Garner 2009). Ratios vary by FCSU definition. The ratios based on the housing consumption shelter measure were second lowest in 2006 (80.8 percent) but were the highest by 2008 (over 83 percent)

As expected, the different ways to account for shelter in the thresholds impacts both the level but not the trends as much. The CE-defined threshold includes the least amount for shelter needs, followed by the OOP thresholds. The only difference between these two is the addition of mortgage principal payments. Adjusting shelter expenditures for homeowners without mortgages and for subsidized renters, allowing their for food, clothing, and utilities to remain as they would have if shelter were not adjusted, increases the thresholds but not by as much as if these two groups of references families were dropped from the threshold sample. The shelter consumption based threshold is the highest for all years. In the latter period, as represented by series 8, the housing consumption thresholds are almost exactly the same as the OOP-drop thresholds when based on reference families alone (Chart 6). These two thresholds are the same by 2008 when the thresholds are updated by the 33rd percentile rather than the median equivalence scale (Chart 7).

Using all consumer units (CUs), applying the three-parameter equivalence scale to derive single adult thresholds and then applying again the three-parameter equivalence scale results in reference family thresholds that differ from those based on reference families only (see charts 8 and 9). When all CUs are used, the CE-defined reference family thresholds are lower than those based on a reference family sample only, and the housing consumption thresholds are higher. These results are not surprising since the FCSU

expenditures are more diverse for the full U.S. population than for families composed of two adults and two children alone. A striking difference between the thresholds based on the reference families only and those based on all CUs, regardless of the updating mechanism, is that the level and trends are almost exactly the same when FCSU expenditures for all CUs are used. This is likely due to the fact that the 33rd percentile-to-median ratios are almost constant when all consumer units are in the sample (see Chart 11).

Conclusions

The thresholds presented in this study, unlike the official thresholds, reflect recent spending and consumption needs in levels and patterns. They account for changes in living standards over time, unlike the official measure. A focus on meeting spending needs versus consumption needs dictates which threshold is more appropriate. Both types have been produced in this study. The results presented reveal thresholds that have been increasing at a faster rate than official poverty thresholds. This is not surprising given the different assumptions underlying the NAS approach and the official measure.

Shelter accounts for the largest percentage of the FCSU thresholds. Therefore the treatment of shelter in the thresholds is of upmost importance. In this research, we have moved beyond the spending based thresholds used by the Panel (CE-defined expenditures) and those based strictly on out-of-pocket expenditures (OOP) to account for the needs of all owners and all renters, regardless of whether they have a mortgage or not or live in subsidized housing or not.

The OOP-drop and OOP-adjust thresholds made adjustments to spending such that the cost to live in an owned home would be the same for all owners and the costs to live in a rental unit would be the same for all renters. We noted that the OOP-drop thresholds were biased upward since owners without mortgages and renters with subsidies were excluded from the estimation sample. To obtain a measure of resources that is consistent with the OOP-adjust threshold, only the subsidies for renters would be added to resources. For the other OOP thresholds, nothing extra would be added to resources.

The fifth option moves from spending-based thresholds closer to a consumption based threshold. The housing consumption threshold reflects what it would cost to meet shelter consumption needs, regardless of housing status, and out-of-pocket needs for food, clothing, and utilities. When using consumption based thresholds, the subsidies received by renters would be added to resources and the implicit net rental income from owning one's home would be added to resources.

This research highlights:

1. the importance of the definition of shelter used for the thresholds,
2. that spending and consumption needs change over time in real terms,
3. that the base period for the initial threshold matters, and
4. the sample underlying the identification of the distribution of FCSU expenditures matters.

Regardless of the shelter definition selected for the modern threshold, the resource measure must be consistently defined, including additions to resources for shelter or not. As one of the main uses of a new poverty measure could be to study the impact of government transfers and other programs on poverty rates, it seems natural that the spending and consumption needs of renters with and without subsidizes would be the same and accounted for in the thresholds. OOP-adjust and housing consumption thresholds meet this criterion.

The question of homeowners without mortgages remains a challenge for poverty measurement. Given the current mix of owned housing with and without mortgages, one might want to account for the increase in spending needs so that all owners are treated the same, as mortgages holders. Another option is to develop a threshold that would allow us to account for the implicit transfers families receive from owning their own homes. Three options were presented in this research: dropping this group from the threshold sample, adjusting their spending on shelter so that it would look like that of homeowners with mortgages, or treat all homeowners the same by using report rental equivalence values from the CE survey. The OOP-drop option results in thresholds that are biased upwards due to the fact that homeowners without mortgages have different spending patterns for food, clothing, and utilities. OOP-adjust thresholds were proposed as a way to allow these homeowners to maintain their spending for these other goods and services, while

bumping their shelter expenditures up. This option is appealing; however, the relationship between FCSU spending and total outlays, with and without mortgages differs over consumer unit types (see Betson 2009) and likely over time. Before applying this method in production, additional research is needed. The fifth option, the housing consumption threshold, treats all owners and renters the same. The BLS uses owners' equivalent rents for the CPI; thus, using rental equivalence for poverty measurement would be consistent with this other major economic statistic. In addition, the internationally poverty thresholds often used in World Bank studies (with price adjustments based on Purchasing Price Parities) are based on consumption and are designed to account for the rental equivalence of owner-occupied housing (gleaned from Angus Deaton's speech given at the ASSA 2010, January 4). Also, implementing a modern poverty measure based on rental equivalence would be much easier than adjusting homeowners without mortgages expenditures using the method proposed by Betson (2009).

In selecting the approach to develop the FCSU thresholds, it is necessary to keep in mind the properties that the Panel deemed desirable for a modern poverty measure for the United States: consistency in the construction of thresholds and resources; statistical defensibility; understandability; broad acceptance by the public; and operational feasibility. As we have shown, all of the methods used to produce the thresholds dictate the use of resources that are consistently defined. Some are more statistically defensible than others and the operational feasibility varies as well. We know that the first two threshold measures, the CE-defined and OOP thresholds, are acceptable to the public (and presumably understandable) as they have been used for several years now by the public. Consumption based thresholds have also been used. The other options, the OOP-drop and OOP-adjust, are still to be vetted by researchers and by the statistical agencies responsible for the possible implementation of a new poverty measure for the United States.

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Table 1. Rent Regression to Impute Rents for Renters Receiving Subsidies.
Sample: All Renters. Data: 2004Q1-2005Q1 CE Interview.

```
------------------------------------------------------------------------------
Source |       SS       df       MS              Number of obs =   11805
-------------+------------------------------           F( 38, 11766) =  179.57
       Model |  2199.04611    38  57.8696344           Prob > F      =  0.0000
    Residual |  3791.88312 11766  .322274615           R-squared     =  0.3671
-------------+------------------------------           Adj R-squared =  0.3650
       Total |  5990.92923 11804  .507533822           Root MSE      =  .56769

------------------------------------------------------------------------------
      lnrent |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    detached |   .1242012   .0280863     4.42   0.000     .0691475     .179255
    rowhouse |   .1720682   .0322084     5.34   0.000     .1089344    .2352019
      endrow |   .1573149   .0441066     3.57   0.000     .0708586    .2437711
      duplex |   .1758895   .0303875     5.79   0.000     .1163249     .235454
     numplex |    .176296   .0316019     5.58   0.000     .1143511     .238241
      garden |   .1769723   .0301893     5.86   0.000     .1177963    .2361484
      hirise |   .3251252   .0343593     9.46   0.000     .2577753     .392475
     aptflat |    .196757   .0267823     7.35   0.000     .1442594    .2492547
        room |   .0039405   .0054536     0.72   0.470    -.0067494    .0146303
       room2 |   .0001078   .0001742     0.62   0.536    -.0002337    .0004494
        bath |   .1231849   .0401506     3.07   0.002     .0444831    .2018868
       bath2 |   .0033287   .0112864     0.29   0.768    -.0187945    .0254519
       hbath |   .1196439   .0374303     3.20   0.001     .0462744    .1930134
      hbath2 |  -.0435747     .02557    -1.70   0.088     -.093696    .0065466
   ldwellage |   -.000769   .0011839    -0.65   0.516    -.0030896    .0015516
  ldwellage2 |   4.71e-06   .0000132     0.36   0.721    -.0000211    .0000305
      age100 |  -.1906575   .0560891    -3.40   0.001    -.3006014   -.0807137
missdwellage |  -.0658015   .0240413    -2.74   0.006    -.1129264   -.0186765
        pool |   .0555228   .0165976     3.35   0.001     .0229888    .0880568
   haveporch |    .008578    .011975     0.72   0.474    -.0148949     .032051
  centralair |   .0102884   .0131321     0.78   0.433    -.0154528    .0360295
     yes_apl |   .0329902   .0142718     2.31   0.021     .0050152    .0609653
 energy_rent |   .0466686   .0126273     3.70   0.000      .021917    .0714202
 water_trash |   .0448854   .0148248     3.03   0.002     .0158264    .0739444
       crowd |   .1152696   .0153837     7.49   0.000     .0851151    .1454242
      insmsa |    .284777    .016324    17.45   0.000     .2527793    .3167747
       south |  -.2425786   .0183897   -13.19   0.000    -.2786255   -.2065317
     midwest |  -.2140218   .0180187   -11.88   0.000    -.2493415   -.1787022
        west |  -.0347507   .0172534    -2.01   0.044    -.0685703    -.000931
      income |   .1137067    .003791    29.99   0.000     .1062758    .1211376
     income2 |  -.0029356   .0002022   -14.52   0.000    -.0033319   -.0025393
         sub |  -.8562419   .0297046   -28.83   0.000    -.9144679   -.7980158
     sincome |   .2248147    .021247    10.58   0.000     .1831671    .2664622
    sincome2 |  -.0166483   .0024774    -6.72   0.000    -.0215044   -.0117922
          y1 |    .021157   .0163617     1.29   0.196    -.0109146    .0532287
          y2 |   .0161869   .0164938     0.98   0.326    -.0161437    .0485174
          y3 |   .0164718   .0165188     1.00   0.319    -.0159078    .0488514
          y4 |   .0124247   .0164054     0.76   0.449    -.0197326    .0445821
       _cons |   6.498652   .0507308   128.10   0.000     6.399211    6.598093
------------------------------------------------------------------------------
```

Table 2. Rent Regression to Impute Rents for Renters Receiving Subsidies.
Sample: All Renters. Data: 2005Q2-2006Q1 CE Interview.

```
------------------------------------------------------------------------------
Source |       SS       df       MS              Number of obs =    9354
-------------+------------------------------           F( 37,  9316) =  136.32
       Model |  1870.69615    37  50.5593553           Prob > F      =  0.0000
    Residual |  3455.29897  9316  .370899417           R-squared     =  0.3512
-------------+------------------------------           Adj R-squared =  0.3487
       Total |  5325.99512  9353  .569442437           Root MSE      =  .60902

------------------------------------------------------------------------------
      lnrent |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    detached |     .11836   .0323083     3.66   0.000     .0550288    .1816913
    rowhouse |    .126765   .0391369     3.24   0.001     .0500481    .2034818
      endrow |   .2216177   .0551793     4.02   0.000     .1134543    .3297811
      duplex |   .1362315   .0368666     3.70   0.000      .063965    .2084981
     numplex |   .1197765   .0384027     3.12   0.002     .0444988    .1950542
      garden |   .1175732   .0387282     3.04   0.002     .0416574     .193489
      hirise |   .2836297   .0426777     6.65   0.000     .1999721    .3672872
     aptflat |   .1576171   .0312327     5.05   0.000     .0963943      .21884
        room |   .0052695   .0063983     0.82   0.410    -.0072726    .0178116
       room2 |   .0002523   .0001683     1.50   0.134    -.0000776    .0005821
        bath |  -.0167867   .0616998    -0.27   0.786    -.1377318    .1041584
       bath2 |   .0322265    .019552     1.65   0.099    -.0060996    .0705526
       hbath |   .1290902   .0320312     4.03   0.000      .066302    .1918784
      hbath2 |  -.0305009   .0188063    -1.62   0.105    -.0673654    .0063636
   ldwellage |  -.0025268   .0013531    -1.87   0.062     -.005179    .0001255
  ldwellage2 |    .000015   .0000148     1.01   0.312    -.0000141    .0000441
      age100 |   .0101305   .0614537     0.16   0.869    -.1103322    .1305932
missdwellage |  -.1263478   .0284945    -4.43   0.000    -.1822032   -.0704923
        pool |  -.0157419   .0201098    -0.78   0.434    -.0551614    .0236776
   haveporch |    .023453   .0140052     1.67   0.094    -.0040002    .0509063
  centralair |   .0325792   .0155903     2.09   0.037     .0020189    .0631395
     yes_apl |   .1027375   .0174393     5.89   0.000     .0685526    .1369224
 energy_rent |   .1003197   .0152401     6.58   0.000     .0704458    .1301935
 water_trash |   .0281015   .0176037     1.60   0.110    -.0064056    .0626087
       crowd |   .1042168   .0172555     6.04   0.000     .0703924    .1380413
      insmsa |   .3084223   .0229428    13.44   0.000     .2634495    .3533952
       south |  -.2770879   .0215546   -12.86   0.000    -.3193397   -.2348362
     midwest |  -.2532286   .0225416   -11.23   0.000    -.2974151    -.209042
        west |   .0034923   .0215212     0.16   0.871     -.038694    .0456787
      income |   .1036481   .0040461    25.62   0.000     .0957168    .1115793
     income2 |  -.0023339   .0001827   -12.77   0.000     -.002692   -.0019757
         sub |  -.8766729   .0369926   -23.70   0.000    -.9491864   -.8041593
     sincome |   .2738198   .0289028     9.47   0.000      .217164    .3304756
    sincome2 |  -.0248658   .0039115    -6.36   0.000    -.0325333   -.0171983
          y6 |   .0325614   .0179335     1.82   0.069    -.0025923     .067715
          y7 |   .0285056   .0178827     1.59   0.111    -.0065484    .0635595
          y8 |   .0542008   .0175786     3.08   0.002     .0197428    .0886587
       _cons |   6.667222   .0655047   101.78   0.000     6.538819    6.795626
------------------------------------------------------------------------------
```

Table 3. Rent Regression to Impute Rents for Renters Receiving Subsidies.
Sample: All Renters. Data: 2006Q2-2007Q1 CE Interview.

Source	SS	df	MS	Number of obs =	8566
				F(37, 8528) =	144.70
Model	1886.97735	37	50.9993879	Prob > F =	0.0000
Residual	3005.64489	8528	.352444289	R-squared =	0.3857
				Adj R-squared =	0.3830
Total	4892.62225	8565	.571234355	Root MSE =	.59367

lnrent	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
detached	.0212705	.0345685	0.62	0.538	-.0464921	.0890331
rowhouse	.0509333	.0401931	1.27	0.205	-.0278549	.1297214
endrow	.0474356	.0566255	0.84	0.402	-.063564	.1584352
duplex	.0455546	.0396787	1.15	0.251	-.0322252	.1233344
numplex	-.0251913	.0414043	-0.61	0.543	-.1063538	.0559711
garden	.0722565	.0417767	1.73	0.084	-.0096359	.154149
hirise	.2052629	.0429578	4.78	0.000	.1210551	.2894706
aptflat	.068702	.0331737	2.07	0.038	.0036736	.1337304
room	.0130305	.0061854	2.11	0.035	.0009056	.0251554
room2	-.0002809	.000112	-2.51	0.012	-.0005004	-.0000614
bath	-.1060445	.0548703	-1.93	0.053	-.2136035	.0015145
bath2	.0558163	.0167801	3.33	0.001	.0229233	.0887094
hbath	.2331286	.043432	5.37	0.000	.1479914	.3182657
hbath2	-.1021477	.028609	-3.57	0.000	-.1582283	-.0460671
ldwellage	-.0043214	.001416	-3.05	0.002	-.0070971	-.0015458
ldwellage2	.0000456	.0000153	2.98	0.003	.0000156	.0000756
age100	-.1074236	.0589889	-1.82	0.069	-.2230561	.008209
missdwellage	-.1263331	.0308007	-4.10	0.000	-.1867099	-.0659564
pool	.0146843	.0210143	0.70	0.485	-.0265087	.0558774
haveporch	-.0267299	.014416	-1.85	0.064	-.0549887	.001529
centralair	.022319	.0161024	1.39	0.166	-.0092456	.0538835
yes_apl	.1102647	.0175029	6.30	0.000	.0759547	.1445747
energy_rent	.0902665	.0156795	5.76	0.000	.0595308	.1210021
water_trash	.0358134	.0176943	2.02	0.043	.0011283	.0704985
crowd	.095355	.0182547	5.22	0.000	.0595714	.1311386
insmsa	.3226028	.022975	14.04	0.000	.2775662	.3676394
south	-.2239311	.0214109	-10.46	0.000	-.2659018	-.1819605
midwest	-.2599636	.0215778	-12.05	0.000	-.3022614	-.2176658
west	.0087352	.0209536	0.42	0.677	-.032339	.0498095
income	.0963199	.0039345	24.48	0.000	.0886073	.1040325
income2	-.0020726	.0001751	-11.84	0.000	-.0024158	-.0017295
sub	-.9521857	.0345182	-27.59	0.000	-1.01985	-.8845218
sincome	.2374149	.0237073	10.01	0.000	.1909429	.2838869
sincome2	-.014644	.0023868	-6.14	0.000	-.0193227	-.0099652
y10	-.0005898	.0182318	-0.03	0.974	-.0363286	.035149
y11	.0282164	.0180944	1.56	0.119	-.007253	.0636859
y12	.0318903	.0180991	1.76	0.078	-.0035884	.0673691
_cons	6.892635	.0639251	107.82	0.000	6.767326	7.017944

Table 4. Rent Regression to Impute Rents for Renters Receiving Subsidies.
Sample: All Renters. Data: 2007Q2-2008Q1 CE Interview.

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Source |       SS       df       MS              Number of obs =    8450
-------------+------------------------------           F( 37,  8412) =  148.58
       Model |  1859.51499    37  50.2571619           Prob > F      =  0.0000
    Residual |   2845.2704  8412  .338239468           R-squared     =  0.3952
-------------+------------------------------           Adj R-squared =  0.3926
       Total |  4704.78539  8449  .556845235           Root MSE      =  .58158

------------------------------------------------------------------------------
      lnrent |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    detached |   .0684705   .0326599     2.10   0.036      .004449     .132492
    rowhouse |    .115226   .0393017     2.93   0.003      .038185     .192267
      endrow |   .0889048   .0538403     1.65   0.099    -.0166354    .1944451
      duplex |   .1053194   .0375867     2.80   0.005     .0316403    .1789985
     numplex |   .0169334    .039947     0.42   0.672    -.0613726    .0952395
      garden |   .1033141   .0416512     2.48   0.013     .0216675    .1849607
      hirise |   .2761108   .0443574     6.22   0.000     .1891593    .3630623
     aptflat |   .1162814   .0314637     3.70   0.000     .0546047    .1779581
        room |   .0025404   .0071347     0.36   0.722    -.0114454    .0165262
       room2 |   -.000054   .0003063    -0.18   0.860    -.0006543    .0005464
        bath |   .0250103   .0505957     0.49   0.621    -.0741698    .1241904
       bath2 |   .0228511   .0144366     1.58   0.113    -.0054481    .0511504
       hbath |   .1726426   .0402818     4.29   0.000     .0936804    .2516049
      hbath2 |  -.0767877   .0266366    -2.88   0.004     -.129002   -.0245734
   ldwellage |    .000028   .0013913     0.02   0.984    -.0026992    .0027552
  ldwellage2 |  -8.50e-06   .0000151    -0.56   0.572     -.000038     .000021
      age100 |   .1293428    .063125     2.05   0.040     .0056023    .2530833
missdwellage |  -.0567568   .029919     -1.90   0.058    -.1154054    .0018918
        pool |   .0352005   .020529      1.71   0.086    -.0050414    .0754423
   haveporch |  -.0115303   .0143207    -0.81   0.421    -.0396024    .0165419
  centralair |   .0376282   .0157517     2.39   0.017      .006751    .0685053
     yes_apl |   .1119291   .0167214     6.69   0.000      .079151    .1447073
 energy_rent |   .0588517   .0154011     3.82   0.000     .0286617    .0890417
 water_trash |   .0354276   .0172752     2.05   0.040     .0015639    .0692913
       crowd |   .1313947   .0185485     7.08   0.000     .0950351    .1677543
      insmsa |   .3793788   .0219136    17.31   0.000     .3364228    .4223349
       south |  -.2628589   .0212206   -12.39   0.000    -.3044566   -.2212612
     midwest |  -.2051163   .0213718    -9.60   0.000    -.2470102   -.1632223
        west |   .0531038   .0208989     2.54   0.011     .0121367    .0940708
      income |   .0885976   .0039789    22.27   0.000     .0807979    .0963973
     income2 |  -.0018328   .0001806   -10.15   0.000    -.0021869   -.0014788
         sub |  -1.068349    .035461   -30.13   0.000    -1.137861   -.9988368
     sincome |   .3405218   .0217285    15.67   0.000     .2979286     .383115
    sincome2 |  -.0214266   .0016837   -12.73   0.000     -.024727   -.0181261
         y14 |   .0088459   .0179224     0.49   0.622    -.0262864    .0439782
         y15 |   .0049323   .0178432     0.28   0.782    -.0300448    .0399094
         y16 |   .0312681   .0179813     1.74   0.082    -.0039797    .0665158
       _cons |   6.681166   .0619022   107.93   0.000     6.559823     6.80251
------------------------------------------------------------------------------
```

Table 5. Rent Regression to Impute Rents for Renters Receiving Subsidies.
Sample: All Renters. Data: 2008Q2-2009Q1 CE Interview.

Source	SS	df	MS		
Model	1929.58865	37	52.1510446	Number of obs =	8512
Residual	2999.14665	8474	.353923371	F(37, 8474) =	147.35
Total	4928.7353	8511	.579101785	Prob > F =	0.0000
				R-squared =	0.3915
				Adj R-squared =	0.3888
				Root MSE =	.59491

lnrent	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
detached	.164759	.033565	4.91	0.000	.0989633	.2305547
rowhouse	.2856371	.0406355	7.03	0.000	.2059817	.3652925
endrow	.0906281	.0543283	1.67	0.095	-.0158686	.1971248
duplex	.187639	.0396763	4.73	0.000	.1098637	.2654143
numplex	.1440219	.0413876	3.48	0.001	.062892	.2251518
garden	.1987008	.043173	4.60	0.000	.1140712	.2833303
hirise	.2949598	.044225	6.67	0.000	.2082681	.3816515
aptflat	.227994	.0329749	6.91	0.000	.1633553	.2926328
room	-.0111437	.0068083	-1.64	0.102	-.0244896	.0022022
room2	.0007401	.0001853	3.99	0.000	.0003769	.0011033
bath	.1581032	.0354747	4.46	0.000	.0885642	.2276423
bath2	-.015561	.0081785	-1.90	0.057	-.0315929	.0004709
hbath	.0838336	.0373953	2.24	0.025	.0105297	.1571375
hbath2	-.0280153	.0238652	-1.17	0.240	-.074797	.0187664
ldwellage	-.0010068	.0013659	-0.74	0.461	-.0036843	.0016707
ldwellage2	2.41e-06	.0000142	0.17	0.866	-.0000255	.0000303
age100	.046852	.0619721	0.76	0.450	-.0746285	.1683325
missdwellage	-.0626632	.0300031	-2.09	0.037	-.1214767	-.0038497
pool	-.0186042	.0214136	-0.87	0.385	-.06058	.0233716
haveporch	-.0308105	.0147686	-2.09	0.037	-.0597605	-.0018606
centralair	.0116985	.0157194	0.74	0.457	-.0191153	.0425123
yes_apl	.1264954	.0168499	7.51	0.000	.0934655	.1595253
energy_rent	.0391883	.0158278	2.48	0.013	.008162	.0702146
water_trash	.0396695	.0173774	2.28	0.022	.0056056	.0737334
crowd	.104088	.0199449	5.22	0.000	.0649911	.143185
insmsa	.4134749	.0225587	18.33	0.000	.3692543	.4576956
south	-.2146186	.021657	-9.91	0.000	-.2570715	-.1721657
midwest	-.1633603	.0222127	-7.35	0.000	-.2069027	-.1198179
west	.0380344	.0213727	1.78	0.075	-.0038613	.0799301
income	.1020135	.0040153	25.41	0.000	.0941425	.1098844
income2	-.0021504	.0001719	-12.51	0.000	-.0024874	-.0018135
sub	-.7776943	.0314448	-24.73	0.000	-.8393338	-.7160549
sincome	.1303728	.0151497	8.61	0.000	.1006757	.1600698
sincome2	-.0049828	.0008009	-6.22	0.000	-.0065528	-.0034128
y18	-.0110155	.0183705	-0.60	0.549	-.0470262	.0249951
y19	.0427997	.0182591	2.34	0.019	.0070074	.078592
y20	.0530409	.0181977	2.91	0.004	.017369	.0887128
_cons	6.516084	.0611129	106.62	0.000	6.396288	6.635881

Table 6. Reference Family (Two Adults with Two Children) Thresholds Updated by the Median (All Thresholds in December 2006 U.S. Dollars)

			Expenditure Concept				
Series	12 quarters of data for each threshold	Annual Threshold	CE	OOP	OOP-Drop	OOP-Adjust	Housing Consumption
1	2004Q1-2006Q4		$21,864	$23,302	$24,828	$24,028	$25,667
2	2004Q2-2007Q1	2006	$22,076	$23,522	$25,006	$24,237	$25,825
3	2004Q3-2007Q2		$22,388	$23,847	$25,265	$24,525	$26,122
4	2004Q4-2007Q3		$22,745	$24,173	$25,441	$24,763	$26,363
5	2005Q1-2007Q4		$23,028	$24,432	$25,701	$25,014	$26,426
6	2005Q2-2008Q1	2007	$23,244	$24,634	$25,894	$25,177	$26,491
7	2005Q3-2008Q2		$23,331	$24,798	$26,146	$25,330	$26,488
8	2005Q4-2008Q3		$23,519	$24,987	$26,399	$25,589	$26,543
9	2006Q1-2008Q4		$23,535	$24,945	$26,384	$25,552	$26,426
10	2006Q2-2009Q1	2008	$23,586	$24,990	$26,434	$25,595	$26,326

Source: U.S. Consumer Expenditure Interview Survey public use data.

Table 7. Reference Family (Two Adults with Two Children) Thresholds Updated by the 33rd Percentile (All Thresholds in December 2006 U.S. Dollars)

			Expenditure Concept				
Series	12 quarters of data for each threshold	Annual Threshold	CE	OOP	OOP-Drop	OOP-Adjust	Housing Consumption
1	2004Q1-2006Q4		$21,864	$23,302	$24,828	$24,028	$25,667
2	2004Q2-2007Q1	2006	$22,034	$23,558	$25,015	$24,150	$25,841
3	2004Q3-2007Q2		$22,300	$23,814	$25,331	$24,428	$26,200
4	2004Q4-2007Q3		$22,579	$24,181	$25,601	$24,804	$26,561
5	2005Q1-2007Q4		$22,853	$24,474	$25,852	$25,126	$26,807
6	2005Q2-2008Q1	2007	$22,985	$24,679	$26,023	$25,274	$26,917
7	2005Q3-2008Q2		$23,173	$24,887	$26,257	$25,513	$27,011
8	2005Q4-2008Q3		$23,419	$25,164	$26,561	$25,766	$27,106
9	2006Q1-2008Q4		$23,537	$25,242	$26,698	$25,877	$27,068
10	2006Q2-2009Q1	2008	$23,600	$25,360	$26,892	$26,026	$27,125

Source: U.S. Consumer Expenditure Interview Survey public use data.

Table 8. Equivalized Reference Family (Two Adults with Two Children) Thresholds Updated by the Median Based on All Consumer Units (All Thresholds in December 2006 U.S. Dollars)

			Expenditure Concept				
Series	12 quarters of data for each threshold	Annual Threshold	CE	OOP	OOP-Drop	OOP-Adjust	Housing Consumption
1	2004Q1-2006Q4		20712	21540	25156.8	23572.8	26797.2
2	2004Q2-2007Q1	2006	$20,848	$21,685	$25,322	$23,711	$26,933
3	2004Q3-2007Q2		$21,064	$21,912	$25,516	$23,971	$27,161
4	2004Q4-2007Q3		$21,244	$22,124	$25,688	$24,175	$27,366
5	2005Q1-2007Q4		$21,446	$22,331	$25,893	$24,407	$27,530
6	2005Q2-2008Q1	2007	$21,630	$22,523	$26,074	$24,587	$27,653
7	2005Q3-2008Q2		$21,814	$22,732	$26,336	$24,803	$27,801
8	2005Q4-2008Q3		$21,949	$22,869	$26,496	$24,969	$27,852
9	2006Q1-2008Q4		$22,027	$22,993	$26,601	$25,068	$27,891
10	2006Q2-2009Q1	2008	$22,165	$23,179	$26,745	$25,245	$27,946

Source: U.S. Consumer Expenditure Interview Survey public use data.

Table 10. Equivalized Reference Family (Two Adults with Two Children) Thresholds Updated by the 33rd Percentile Based on All Consumer Units (All Thresholds in December 2006 U.S. Dollars)

			Expenditure Concept				
Series	12 quarters of data for each threshold	Annual Threshold	CE	OOP	OOP-Drop	OOP-Adjust	Housing Consumption
1	2004Q1-2006Q4		$20,712	$21,540	$25,157	$23,573	$26,797
2	2004Q2-2007Q1	2006	$20,840	$21,670	$25,300	$23,695	$26,936
3	2004Q3-2007Q2		$21,061	$21,894	$25,506	$23,902	$27,148
4	2004Q4-2007Q3		$21,247	$22,096	$25,693	$24,106	$27,384
5	2005Q1-2007Q4		$21,446	$22,300	$25,904	$24,335	$27,584
6	2005Q2-2008Q1	2007	$21,599	$22,481	$26,087	$24,491	$27,733
7	2005Q3-2008Q2		$21,780	$22,691	$26,280	$24,671	$27,899
8	2005Q4-2008Q3		$21,929	$22,855	$26,466	$24,835	$27,976
9	2006Q1-2008Q4		$22,027	$22,986	$26,593	$24,976	$28,020
10	2006Q2-2009Q1	2008	$22,145	$23,143	$26,758	$25,133	$28,110

Source: U.S. Consumer Expenditure Interview Survey public use data.

Chart 1.

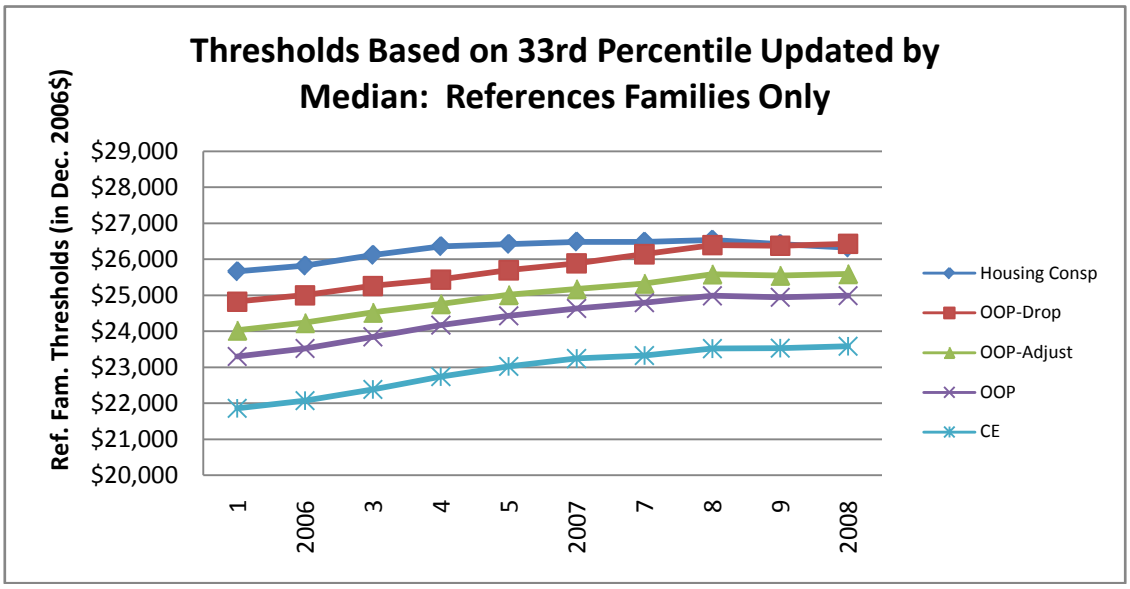

Chart 2.

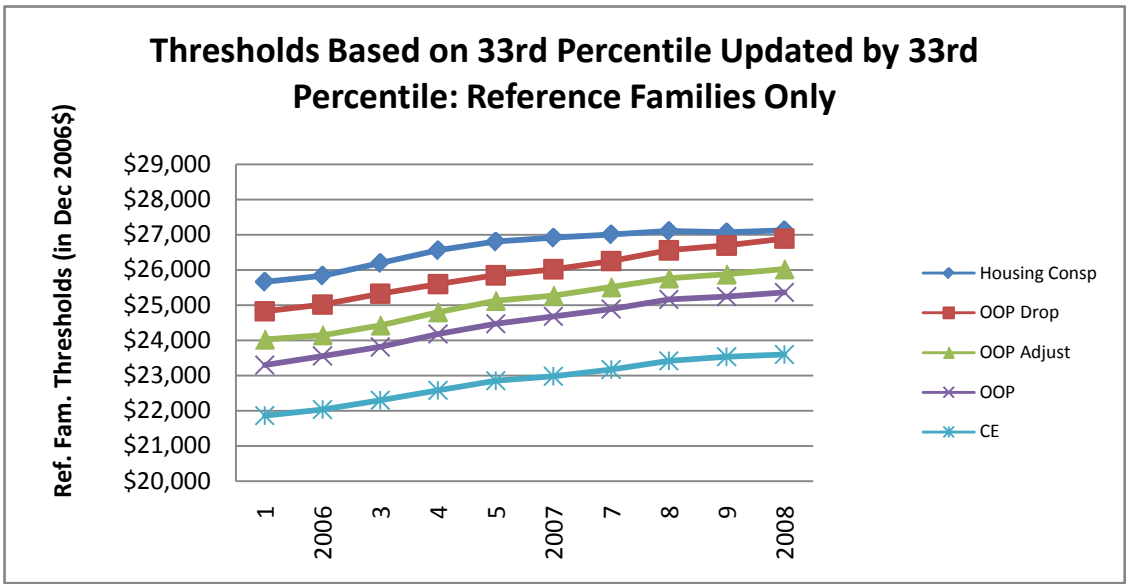

Chart 3.

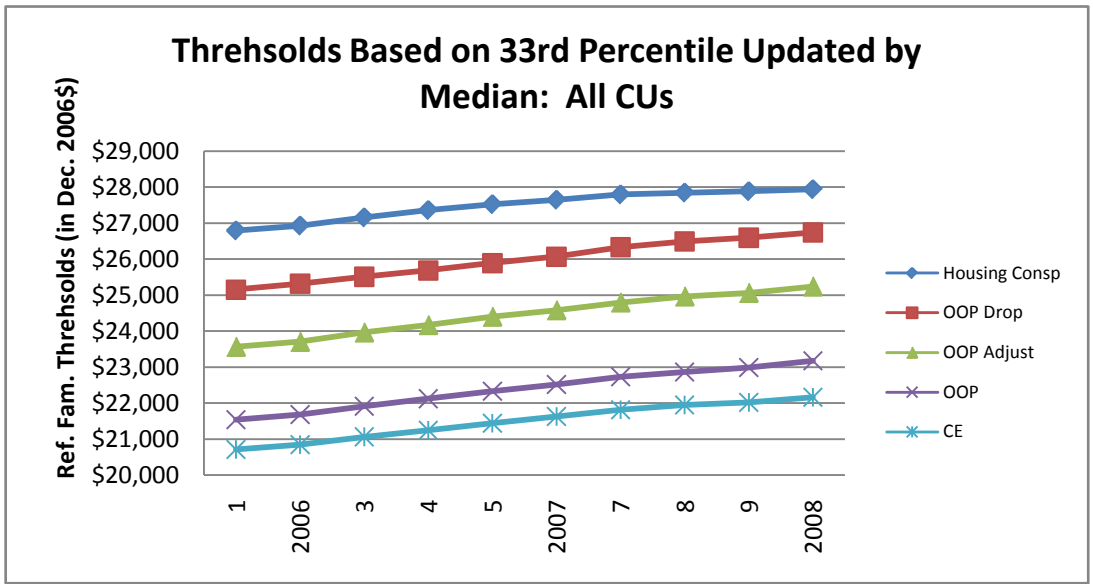

Chart 4.

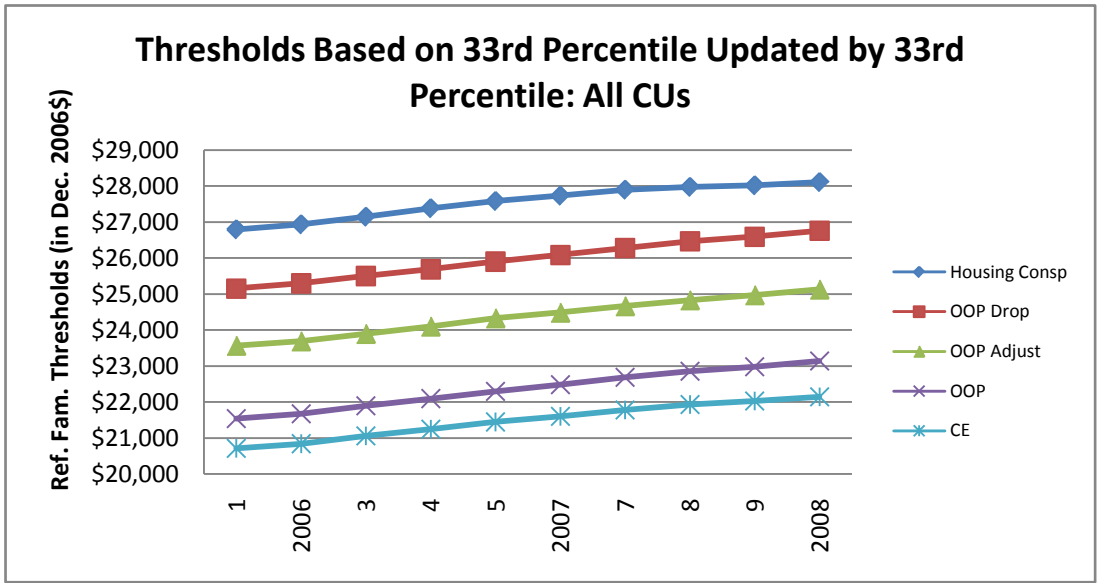

Chart 10. Ratio of 33rd Percentile to Median, Reference Families Only (Based on December 2006$)

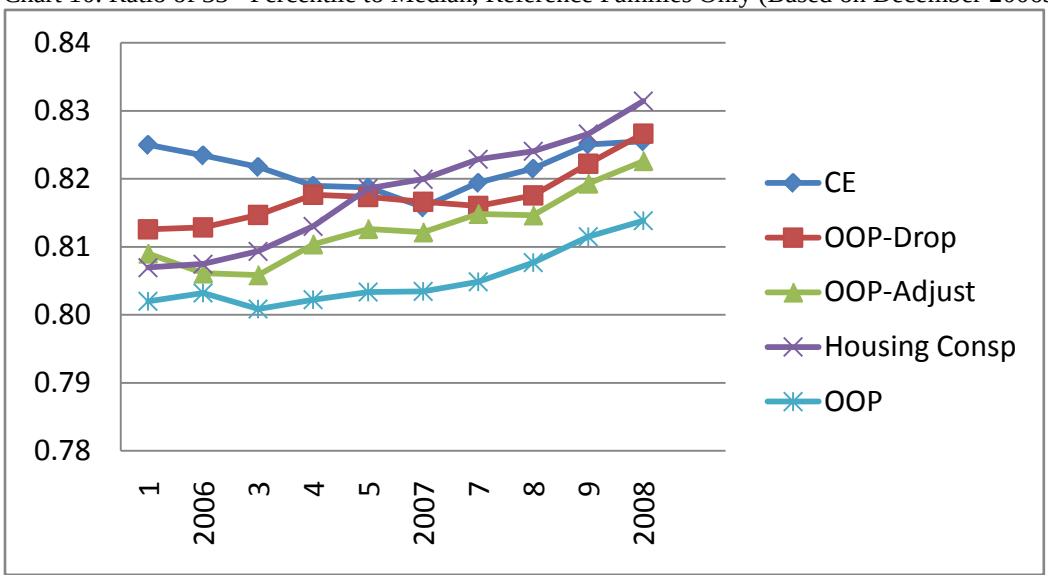

Chart 11. Ratio of 33rd Perentile to Median, All Consumer Units (Based on December 2006$)