



# INVESTIGATING Very High Rent Burdens Among Renters



# American Housing Survey

## **INVESTIGATING VERY HIGH RENT BURDENS AMONG RENTERS IN THE AMERICAN HOUSING SURVEY**

*Prepared For:*

**U.S. Department of Housing & Urban Development  
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*Prepared By:*

**Frederick J. Eggers  
Fouad Moumen  
Econometrica, Inc.  
Bethesda, Maryland**

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## ***Executive Summary***

At the request of the Department of Housing and Urban Development (HUD), Econometrica, Inc. investigated the high proportion of American Housing Survey (AHS) renter households with excessive rent burdens. Rent burden is the sum of rent plus utilities plus the cost of renter insurance, if any, divided by household income. Rent burden ratios equal to or greater than 50 percent are considered excessive because, for these households, the costs of renting may leave inadequate resources for other needed consumption.

The study found:

- In 2007, 28.6 percent of AHS renters who paid cash rent had housing costs that equaled or exceeded 50 percent of their incomes.
- Rent burdens calculated using information on housing costs and income from three other national surveys produced a smaller proportion of households with rent burdens of 50 percent or more. The other surveys were the American Community Survey (ACS), the Consumer Expenditure Survey (CEX), and the Survey of Income and Program Participation (SIPP). These surveys still found that 20 to 25 percent of renter households had rent burdens of 50 percent or more.
- Three of the four surveys found a substantial number of renters with rent burdens that equaled or exceed their income—a seemingly implausible result. (This percentage was not available for the ACS.) The proportions of renters with rent burdens of 100 percent or more ranged from 7 percent in SIPP to almost 12 percent in the AHS.
- Examination of the distributions of household income found that the AHS did have a higher percentage of renter households with incomes less than \$10,000 than the other surveys. While there were some differences between the distribution of renter housing costs in the AHS and those in the other surveys, those differences, unlike the differences in income distributions, did not appear to be systematically related to the differences in the distributions of rent burdens.
- While the questionnaires and data collection protocols differ substantially across the four surveys, the results in terms of renter income and housing costs distributions are quite similar.
- The rent burden distribution becomes less puzzling when viewed over a longer time horizon. Using the AHS, the authors took the ratio of housing cost to income, both summed over the 2003, 2005, and 2007 surveys. Because this calculation could only be done legitimately for units where the household was the same in all 3 years, the weighted count of rental units in the useable sample was reduced from 35 million to 6.3 million. When the rent burden is calculated over multiple years, the proportion of those with rent burden equal to or greater than 50 percent declined to 18.1 percent. As one would expect, the distribution of rent burdens calculated over the 3 years was more tightly

centered than the distributions for the individual years, that is, there were a smaller percentage of cases with very high or very low rent burdens.<sup>1</sup>

- Rent burdens calculated for the same households in the same units varied over the 2003, 2005, and 2007 AHS surveys. Only 5.4 percent of these renter households had rent burdens equal to or exceeding 50 percent in each of the three surveys. Only 0.3 percent had rent burdens equal to or exceeding 100 percent in each of the three surveys.
- Renter households having rent burdens of 50 percent or more in all three AHS surveys (2003, 2005, and 2007) or in two out of three differed from other renter households in some demographic or unit characteristics.
  - The most significant difference was household income. Median income for this group was \$11,695, compared to \$26,875 for all renters.
  - This group was composed of a lower percentage of households with White householders and a higher percentage of households with Black householders.
  - This group also had a higher percentage of elderly households. The median age of the householder for the group was 61 compared to 52 for all renters.
  - The “mostly severe” burden group had a higher proportion of its units in multifamily structures than the other groups, 55 percent versus 50 or 51 percent.
  - Only 85.6 percent of the mostly severe burden units were considered physically adequate compared to over 90 percent for all the other groups.
- There is substantial survey-to-survey variation in the building blocks used to compute rent burden—housing costs and household income. The variation is particularly striking for household income.
  - To measure survey-to-survey variation, we constructed the follow metric using the 2,300 units that were rental and occupied by the same household in the 2003, 2005, and 2007 AHS surveys. For each unit, we took three numbers: monthly housing costs in 2003, monthly housing costs in 2005, and monthly housing costs in 2007 as reported in the AHS. Using these numbers, we computed the following ratio: the difference between the largest monthly housing costs and the smallest monthly housing costs, divided by the average of the three monthly housing costs. We carried out the same calculation for monthly household income.
  - The median value for this measure for monthly housing costs was 23.4 percent; that is, for half of the 2,300 sample units, the difference between the largest and smallest monthly housing costs was more than 23.4 percent of average monthly housing costs.
  - The median value for this measure for monthly household income was 64.7 percent; that is, for half of the 2,300 sample units, the difference between the largest and smallest monthly household income was more than 64.7 percent of average monthly household income.

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<sup>1</sup> This expectation derives from the fact that one-time deviations in rent burden would tend to be “averaged out” by more normal values recorded in the other years.



- The large survey-to-survey variation in measured household income results from a combination of factors: survey-to-survey variation in actual household income, difficulties in collecting accurate information on household income even when households want to cooperate, and difficulties in getting households to willingly report accurate information on income. Low-income households, in particular, often have large year-to-year swings in income. However, the percentage spread was only weakly correlated with income. High-income households had survey-to-survey variation in measured income similar to that of low-income households.<sup>2</sup>
- A simple simulation using assumptions consistent with the 2007 rent burden distribution and the variation in measured housing costs and household income documented in this study demonstrates that variability due to normal fluctuations in income or housing costs or due to measurement error could account for a large share of the proportion of households with very high or very low rent burdens. The simulation assumed that no household had an expected rent burden less than 25 percent or more than 45 percent. But when variability was introduced, the results found 8.2 percent with rent burdens less than 20 percent and 17.8 percent with rent burdens of 50 percent or more. The comparable numbers from the 2007 AHS rent burden distribution are 10.2 and 28.6 percent.
- This study also performed simple tests of how households react to rent burdens. Table 20 analyzes the proportion of households that moved in 2005 and 2007 by the rent burdens experienced by these households in the preceding survey. Surprisingly, there were no meaningful differences in the percentages of moves by households with different rent burdens. For example, 40.8 percent of the households that had severe rent burdens in 2005 had moved by 2007. This percentage is virtually the same as the percentage for all renters in 2005 (41.4 percent). Another test showed that movers wind up in severe rent burden situations in the same proportion as non-movers. Rent burden is supposedly a measure of hardship, but households do not respond in a manner that would reduce the hardship.

This study examined the high proportion of households with severe rent burdens found in the AHS. While the AHS does find a higher percentage of households with severe rent burdens than three other national surveys, all four surveys tell similar stories; that is, more than 20 percent of all renter households spend 50 percent or more of their income on housing cost.

This study's findings do raise questions about the policy usefulness of the rent burden calculation. The survey-to-survey variability in the components used to compute rent burden, particularly household income, calls into question the accuracy of the rent burden measure. In addition, the absence of a relationship between moving and rent burden suggests that households may not be experiencing the hardship that rent burden is intended to measure.

The resources allocated for this study were devoted mainly to comparing rent burdens as calculated by the AHS to rent burdens calculated using data from other surveys. Therefore, only limited attention was given to the issues of how the variability in the housing costs and

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<sup>2</sup> There was no correlation, as well, between the percentage spread in monthly housing costs and monthly housing costs.

household income affects the rent burden measure and whether rent burdens induce household responses that are consistent with the hardship supposedly measured by rent burden. The intuitive appeal of the rent burden measure and its consistent use over many years in measuring housing needs suggests that more attention should be devoted to the resolving the questions raised by this study.

# INVESTIGATING VERY HIGH RENT BURDENS AMONG RENTERS IN THE AMERICAN HOUSING SURVEY

In October 2009, Econometrica, Inc. entered into a contract with the Department of Housing and Urban Development (HUD) to support the American Housing Survey (AHS). Task D of that contract required the Econometrica team to investigate the prevalence of very high ratios of housing costs to income among renter families surveyed by the AHS. This paper reports in six sections what was learned during that investigation:

- Section I provides background information on this issue and explains why it is important to HUD and to housing analysts and policymakers in general.
- Section II compares distributions of rent burden as reported by the AHS with information available in three other federal surveys.
- Section III looks at the consistency of very high rent burdens among the same households over time and examines the demographic, location, and unit characteristics associated with renter households who had severe rent burdens in at least two of the three AHS surveys between 2003 and 2007.
- Section IV looks at data issues. It examines edits and allocations of values for key variables and uses special AHS variables to assess how much outside assistance is received by households with very high rent burdens. This section measures the volatility of the components used to compute rent burden—housing costs and household income. Based on the observed volatility, we use a simple simulation exercise to gauge the extent to which normal variation or measurement errors could produce a high proportion of households with very high rent burdens.
- Section V investigates whether rent burdens have real consequences by assessing the relationship between rent burdens and moves.
- Section VI provides brief concluding observations.

Appendices contain additional tables and more detailed explanations of specific analyses.

## ***I. The Prevalence of Very High Rent Burdens***

Public policy in the housing arena has focused on a number of issues over the past 80 years; among these are the safety and quality of housing units, neighborhood quality, the affordability of housing, and the ability of American families to achieve the dream of homeownership. While federal policy has emphasized expanding homeownership opportunities, the needs of renters have also received high priority. Since 1991, HUD has issued a series of 11 congressionally

mandated reports that estimate the number of renter households who have “worst case housing needs.” The most recent report explained “worst case housing needs” as follows:

Worst case housing needs (WCN) are experienced by unassisted very low-income renters who either (1) pay more than one-half of their monthly income for rent; or (2) live in severely inadequate conditions, or both. HUD defines “very low-income” as below 50 percent of the local area median income ... .<sup>3</sup>

While HUD’s “worst-case needs” definition includes both physical inadequacy and cost burden elements, cost burdens occur much more frequently than physical inadequacies. Of the 5.91 million worst-case needs households in 2007, 5.48 million had severe cost burdens only, 190,000 lived in severely inadequate housing, and another 240,000 had both severe cost burdens and severely inadequate housing.<sup>4</sup> The HUD report also counted the number of renters in 2007, regardless of income or whether they received rental assistance, with a severe problem. Of the 8.56 million with a severe problem, 7.49 million had severe cost burdens only, 771,000 lived in severely inadequate housing, and another 302,000 had both problems.<sup>5</sup>

The ratio of housing costs to income has become the standard measure used to gauge the affordability of rental housing. This ratio is commonly referred to as *rent burden* even though the housing costs component includes utilities and related shelter costs as well as rent. Generally, rental housing is presumed to be affordable if the rent burden is no more than 30 percent.<sup>6</sup> This concept of affordability leaves the renter household with at least 70 percent of its income to take care of important non-shelter needs.<sup>7</sup>

Table 1 presents rent burden data from the published report on the 2007 AHS. Of the 35.0 million renter households, 6.7 percent paid no cash rent (e.g., a unit provided rent free to a janitor), while another 3.0 percent reported either no income or negative income for the year. Rent burdens were calculated for the remaining 31.6 million renter households.

Table 1 distributes the calculated rent burdens into 13 categories, ranging from less than 5 percent to 100 percent or more. The distribution shows that rent burdens, as measured in the AHS, display a wide range of values. Five categories have 10 percent or more of the renter households and 10 of the categories have 5 percent or more. Only 43.6 percent of renter households paid less than 30 percent of their income for housing costs and 28.6 percent paid 50 percent or more of their income. Remarkably, 11.6 percent paid more than 100 percent. When

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<sup>3</sup> *WORST CASE HOUSING NEEDS: A Report to Congress*, U. S. Department of Housing and Urban Development, May 2010, page vii.

<sup>4</sup> *Ibid*, page vii.

<sup>5</sup> *Ibid*, page 55.

<sup>6</sup> An examination of why “30 percent” has become the dividing line between affordable and not affordable rental housing can be found on pages 30 and 31 of *Trends in Housing Costs:1985-2005 and the 30-Percent-of-Income Standard*, a report prepared for HUD by Econometrica, Inc.

See: <http://www2.huduser.org/portal/datasets/ahs/ahsprev.html>.

<sup>7</sup> The rent burden concept appears in many other policy reports on housing. Examples include U.S. Rental Housing Characteristics: Supply, Vacancy, and Affordability, HUD PD&R WORKING PAPER 10–01, January 2010 (Authors: Rob Collinson and Ben Winter), and AMERICA’S RENTAL HOUSING, THE KEY TO A BALANCED NATIONAL POLICY, Joint Center for Housing Studies of Harvard University, 2008.

this group is combined with the renters who have zero or negative income, 13.5 percent of all renter households had housing costs that exceeded their income in 2007, more than one out of every eight renter households.

**Table 1: Rent Burdens in 2007 Based on AHS Data**

<b>Occupied rental units in 2007</b>	<b>35,045,000</b>	<b>Percent of renters</b>	
No cash rent	2,361,000	6.7%	
Zero or negative income	1,067,000	3.0%	
Used in distribution	31,616,000	90.2%	
<b>Rent burden</b>		<b>Percent</b>	<b>Cumulative percent</b>
Less than 5 percent	210,000	0.7%	0.7%
5 to 9 percent	947,000	3.0%	3.7%
10 to 14 percent	2,213,000	7.0%	10.7%
15 to 19 percent	3,225,000	10.2%	20.9%
20 to 24 percent	3,476,000	11.0%	31.9%
25 to 29 percent	3,719,000	11.8%	43.6%
30 to 34 percent	3,096,000	9.8%	53.4%
35 to 39 percent	2,459,000	7.8%	61.2%
40 to 49 percent	3,241,000	10.3%	71.4%
50 to 59 percent	1,945,000	6.2%	77.6%
60 to 69 percent	1,392,000	4.4%	82.0%
70 to 99 percent	2,025,000	6.4%	88.4%
100 percent or more	3,668,000	11.6%	100.0%

The large percentage of renter households that pay more than 50 percent of their income for housing should be a major policy concern, because shelter costs leave these households with less than half of their income for other needs. When the “no cash rent” and “zero or negative income” groups are included, the AHS data show that 28.8 percent of all renters pay more than 50 percent of their income for housing. At the same time, the substantial percentage of renters who pay very high percentages of their income for rent raises questions about the accuracy and usefulness of the rent burden calculation. It is difficult to believe that almost one out of every five renter households (19.3 percent) pays more than 70 percent of its income for housing.<sup>8</sup> For all these reasons, HUD asked Econometrica to investigate the phenomenon of rent burden distributions that show a large percentage of renter households having severe rent burdens.

This report divides renter households into three groups based on rent burden:

- normal rent burden ( $\leq 30\%$ ),
- moderate rent burden ( $30\% < x < 50\%$ ), and
- severe rent burden ( $\geq 50\%$ ).<sup>9</sup>

<sup>8</sup> The percentage includes those with no income or negative income in the numerator and all renter households in the denominator.

<sup>9</sup> Since the analysis uses published rent burden distributions from the AHS and the American Community Survey (ACS), the categories in Table 1 and in Appendix Table A-1 do not correspond to these definitions as rent burdens exactly equal to 30 percent are included in the next highest category.

This phenomenon is closely related to another AHS puzzle, namely, that an unexpectedly high percentage of households in assisted units spend more than 30 percent of their income on housing even though HUD program rules generally limit the housing costs of assisted households to 30 percent of income. Table 2 shows that, in the last three surveys, very high rent burdens appear to be as common among assisted households as among unassisted renters. The bottom panel shows that assisted units are somewhat more likely to have rent burdens in excess of 100 percent. The AHS measure of housing costs includes only the rent paid by the tenant household; it does not include any subsidy provided to the tenant.

**Table 2: Rent Burden Category by Assistance Status**

	<b>2003 Assisted</b>	<b>2003 Unassisted</b>	<b>2005 Assisted</b>	<b>2005 Unassisted</b>	<b>2007 Assisted</b>	<b>2007 Unassisted</b>
Normal burden	54.0%	56.2%	49.1%	53.3%	42.9%	52.7%
Moderate burden	27.0%	23.1%	26.6%	23.1%	28.4%	25.0%
Severe burden	19.1%	20.6%	24.3%	23.6%	28.7%	22.4%
	<b>2003 Assisted</b>	<b>2003 Unassisted</b>	<b>2005 Assisted</b>	<b>2005 Unassisted</b>	<b>2007 Assisted</b>	<b>2007 Unassisted</b>
Normal burden	54.0%	56.2%	49.1%	53.3%	42.9%	52.7%
Moderate burden	27.0%	23.1%	26.6%	23.1%	28.4%	25.0%
50% < Rent burden < 70%	6.0%	8.3%	7.9%	8.6%	8.1%	9.2%
70% < Rent burden < 100%	4.3%	5.1%	4.5%	5.8%	5.7%	5.0%
100% < Rent burden	8.8%	7.2%	11.9%	9.2%	14.8%	8.2%
Number of units with calculated rent burdens( in thousands)	4,759	21,283	4,590	19,814	4,914	24,863

The AHS questions designed to identify assisted households have historically misclassified some assisted households as unassisted and even more unassisted households as assisted. For this reason, HUD has arranged on occasion for the Census Bureau to match addresses between AHS sample units and HUD records on assisted housing units. Using these matches, the Census Bureau produced special reports entitled *Characteristics of HUD-Assisted Renters and their Units* for the 1989, 1991, 1995, and 2003 AHS surveys. Even with more accurate information on who lives in assisted housing, each of these studies found a high proportion of assisted households paying more than 30 percent of income on housing costs. Hopefully, this study will also throw some light on this puzzle.

## **II. Comparison with Rent Burdens Calculated from Other Federal Surveys**

### **A. Other National Surveys with Data on Housing Costs & Incomes**

This investigation begins by comparing rent burdens calculated from the AHS with rent burdens calculated using data from three other surveys to determine whether the severe rent burden phenomenon is unique to the AHS. For this purpose, we chose federal surveys that are national in scope, have large samples, and collect data on income and housing costs. The three surveys are:

- **American Community Survey (ACS)**: The ACS replaces the long-form version of the decennial census. While the ACS is legally part of the decennial census, ACS data are collected monthly and reported for the nation, states, large metropolitan areas, counties, and cities annually.<sup>10</sup> Every month, the Census Bureau surveys 250,000 households and then tallies these data on a calendar-year basis. The survey contains questions on income, rent, and utility costs similar to those in the long-form version of the questionnaire used in previous decennial censuses. The ACS questions are not as detailed as those in the AHS. We use the ACS national data based on year 2007 surveys.
- **Consumer Expenditure Survey (CEX)**: On behalf of the Bureau of Labor Statistics (BLS), the Census Bureau collects information on a continuous basis for the CEX. BLS uses CEX data for a number of purposes, the most important of which are updating the basket of goods used in the Consumer Price Index (CPI) and the weights assigned to the components of the CPI. The CEX consists of two separate surveys: an Interview survey and a Diary survey. This report used only the Interview survey. The Interview survey is conducted once a quarter for 5 successive quarters. The first Interview gathers information on the consumer unit, while all 5 surveys record expenditures during the preceding 3 months. Information on income and assets is collected in the second and fifth surveys. The target sample for the Interview survey is 7,060 consumer units, and the target sample for the Diary survey is 7,050 consumer units. The Interview sample is divided into three panels, one of which is interviewed in the first month of the quarter, one in the second month, and one in the third month. The CEX has more detailed questions on income and shelter costs than the AHS. We use the 2007 CEX.
- **Survey of Income and Program Participation (SIPP)**: Since 1984, the Census Bureau has carried out a survey designed to determine the extent to which households participate in federal programs that assist low income families, such as Food Stamps, welfare, and assisted housing. SIPP was redesigned in 1996. Each panel consists of approximately 37,000 households who are interviewed every 4 months (a wave) for 32 months. The

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<sup>10</sup> Beginning in 2010, the Census Bureau releases three versions of ACS reports each year: (1) information for the nation, states, metropolitan areas, counties, and cities with populations of 65,000 or more based on the previous year's ACS data; (2) information for the nation, states, metropolitan areas, and counties and places with populations of 20,000 or more based on the previous 3 years of ACS data; and (3) information for the nation, states, metropolitan areas, counties, cities, places, and census tracts based on the previous 5 years of ACS data.

households in each panel are divided into four subsets (rotations) that are interviewed in successive months during each 4-month wave. After the initial interview, every wave contains a core group of questions on income and program participation. Some waves contain special-topic questions. We use the sixth wave of the 2004 panel, which was collected between October 2005 and January 2006, because the most recent data on shelter costs come from topical questions asked during this wave. SIPP asks more detailed questions on income and program participation than the AHS but asks about utility costs in a single question.

In this report, the AHS and ACS estimates are calculated from published reports; public use files were employed to derive the CEX and SIPP estimates. The AHS and the ACS use different formats to display rent burdens, so we can break down the “50 percent or more” group for only three of the four surveys. Appendix B describes the CEX in greater detail and explains how the distributions were derived; Appendix C does the same for SIPP.

## **B. Comparisons of Rent Burden Distributions**

Table 3 contains collapsed frequency distributions of rent burdens calculated for these four surveys; the full frequency distributions are available in Table A-1 in Appendix A.

The percentage of renter households with severe rent burdens—those of 50 percent or more—is higher in the AHS than in the other three surveys. The ACS estimates are closest to the AHS’s (24.6 percent versus 28.6 percent), while CEX and SIPP have lower estimates (22.8 percent and 21.8 percent, respectively). These differences are all statistically significant and noteworthy. The percentage of renter households with very high rent burdens is higher in the AHS by 14 percent (4 percentage points) over the ACS, 20 percent over the CEX, and 24 percent over SIPP.

Despite these numerical differences, the four distributions exhibit similar patterns. All four distributions are relatively flat. In many distributions, the categories closest to the mean or median value will contain a substantially larger share of the cases than those further away. This is not a characteristic for any of the four distributions in Table 3, and all four distributions have a substantial percentage of renters at the extremes of the distributions. The “less than 15 percent” and “50 percent or more” categories sum to between 35 and 40 percent of the distribution for all four surveys.

The policy concern raised, and the puzzle discussed, in the preceding section with respect to the AHS carry over in this section to the other three surveys. Each survey finds that more than 20 percent of renters pay more than 50 percent of their income for rent. Therefore, the results from all four surveys present the same public policy concern—specifically, that too many renters appear to be paying too much for rent. At the same time, all three of the surveys that separate this severe rent burden group into narrower categories find a surprising percent of renters (more than 5 percent) paying more than 100 percent of their income for rent. Again, this result seems difficult to believe. In the next section, we examine the consistency of rent burdens over time to determine whether these phenomena are transitory.



**Table 3: Frequency Distributions of Rent Burdens: Comparing Four Federal Surveys**

	<b>AHS (2007)</b>	<b>ACS(2007)</b>	<b>CEX (2007: full sample, imputed income)</b>	<b>SIPP (2005)</b>
Total	35,044,000	36,862,873	NA <sup>11</sup>	36,976,894
Used in distribution	31,616,000	34,081,869	NA	25,783,130
Less than 15 percent	10.7%	13.1%	15.3%	13.7%
15 to 24 percent	21.2%	25.9%	27.6%	26.2%
25 to 34 percent	21.6%	20.8%	19.9%	20.5%
35 to 49 percent	18.0%	15.7%	14.4%	17.9%
50 percent or more	28.6%	24.6%	22.8%	21.8%
50 to 59 percent	6.2%		5.2%	5.4%
60 to 69 percent	4.4%		3.4%	3.8%
70 to 99 percent	6.4%		5.9%	5.6%
100 percent or more	11.6%		8.2%	7.0%
Median (not including zero or negative income and no cash rents)	33	30	29	30
Median (not including zero or negative income and no cash rents and ratios $\geq 1$ )	30	NA	27	28

### **C. Comparison of Housing Costs and Household Income Distributions**

Before moving on, we attempt to explain the differences that do exist across the surveys. Since rent burden is the ratio of housing costs to income, we compared the information on income and housing costs in hopes of explaining why the other surveys produced lower estimates of the number of households with severe rent burdens. Table 4 contains collapsed renter income distributions for all four surveys; fuller distributions are in Table A-2 in Appendix A.

The AHS and CEX report almost identical median incomes, while the median incomes reported by the ACS and SIPP are approximately \$2,000 higher. Of particular significance, the AHS distribution has more households at the bottom end of the income distribution. In the AHS, 17.2 percent of renter households report incomes less than \$10,000, compared to 12.3 to 15.0 percent for the other three surveys. The ACS shows a higher proportion of renter households with

<sup>11</sup> The data were weighted using CEX weights, but the counts are not reported for the CEX, because CEX weights are not designed to add up to national totals with multiple quarters of data. This report uses multiple quarters of data to take advantage of the larger sample size in the full CEX sample.

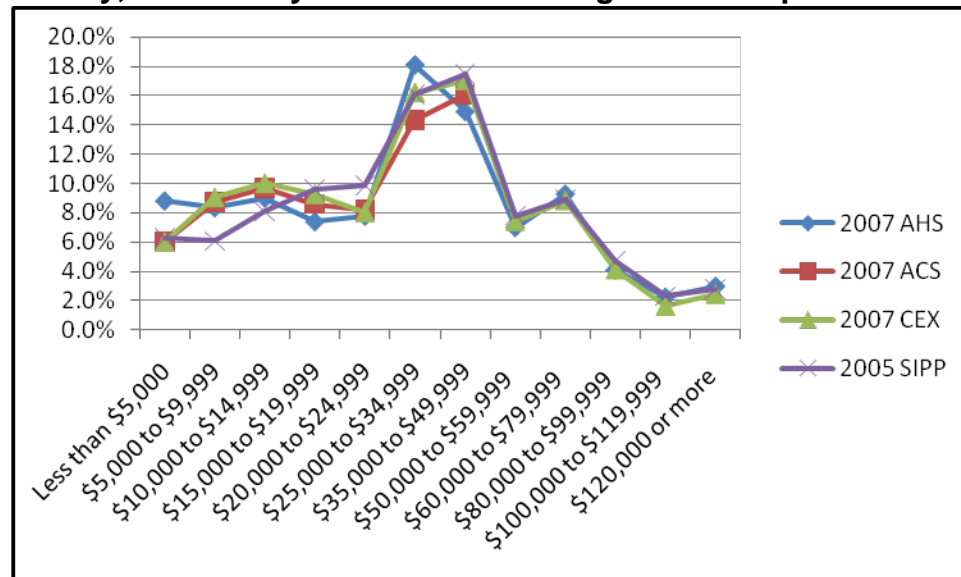
incomes of \$50,000 or more compared to the AHS households, but the AHS proportion is similar to the proportions in the CEX and SIPP. In general, the distributions are relatively flat.

**Table 4: Renter Income Distributions: Comparison of Four Surveys**

Renter household incomes	2007 AHS	2007 ACS	2007 CEX	2005 SIPP
Less than \$10,000	17.2%	14.8%	15.0%	12.3%
\$10,000 to \$24,999	24.2%	26.5%	27.3%	27.5%
\$25,000 to \$34,999	18.1%	14.3%	16.2%	16.1%
\$35,000 to \$49,999	14.9%	16.1%	17.0%	17.5%
\$50,000 or more	25.7%	28.3%	24.5%	26.5%
Median	\$28,921	\$30,915	\$28,800	\$31,008

Figure 1 is based on the fuller income distributions in Table A-2. For incomes greater than \$50,000, the published classes for the AHS do not match the published classes for the ACS. Therefore, Figure 1 is divided into two parts. Part A traces all four surveys up to incomes of \$50,000 and traces the AHS, CEX, and SIPP beyond \$50,000. Part B traces all four surveys up to incomes of \$50,000 and traces the ACS, CEX, and SIPP beyond \$50,000. The Figures demonstrate how close the income distributions are for the four surveys. In both Parts A and B, the AHS has a larger percentage of households in the lowest class and then lower percentages (except for SIPP) in the next two classes.

**Figure 1: Comparisons of Income Distribution for Four Federal Surveys  
Part A: Full Distribution for American Housing Survey, Consumer Expenditure Survey, and Survey of Income and Program Participation**



**Figure 1: Comparisons of Income Distribution for Four Federal Surveys  
Part B: Full Distribution for American Community Survey, Consumer Expenditure Survey, and Survey of Income and Program Participation**

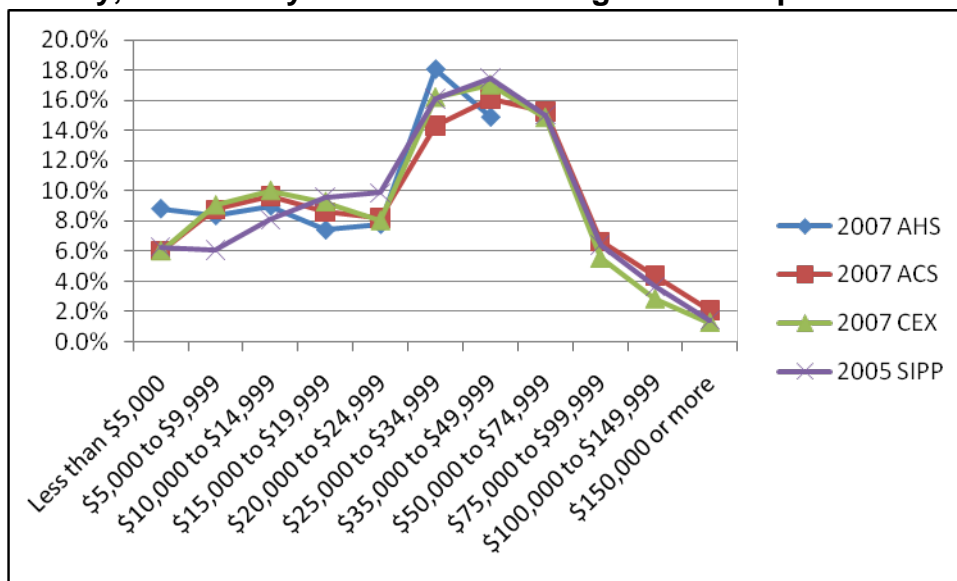


Table 5 contains collapsed distributions of renter housing costs from the four surveys; Table A-3 in Appendix A contains the full distributions.

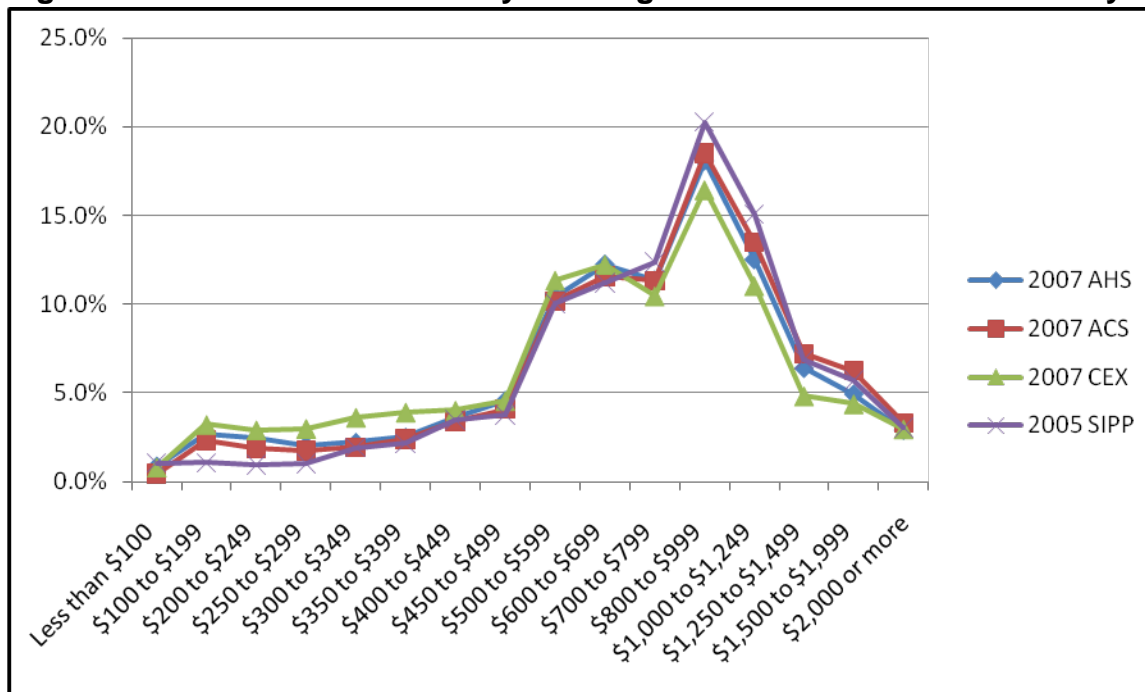
**Table 5: Total Rental Housing Costs Distributions: Comparison of Four Surveys**

Monthly housing costs	2007 AHS	2007 ACS	2007 CEX	2005 SIPP
Less than \$250	6.0%	4.6%	7.0%	3.1%
\$250 to \$449	10.4%	9.5%	14.6%	8.6%
\$450 to \$599	15.0%	14.3%	15.9%	13.8%
\$600 to \$999	41.7%	41.4%	39.2%	43.9%
\$1,000 to \$1,249	12.5%	13.5%	11.1%	15.1%
\$1,250 to \$1,499	6.4%	7.2%	4.8%	6.9%
\$1,500 or more	7.9%	9.6%	7.4%	8.8%
	100.0%	100.0%	100.0%	100.0%
Median	\$755	\$789	\$718	\$799
Less than \$600	31.5%	28.4%	37.5%	25.4%
\$1000 or more	26.8%	30.2%	23.3%	30.7%

The four distributions are very similar and more densely concentrated around the median values than either the rental burden or housing income distributions reported in Tables 3 and 4. The CEX distribution has the lowest proportion of renter households with monthly housing costs of \$1,000 or more, but the AHS has lower proportions than either the ACS or SIPP.

Figure 2 is based on the fuller distributions in Table A-3. It clearly shows the close correspondence in the distributions of monthly housing costs.

**Figure 2: Distributions of Monthly Housing Costs for Four Federal Surveys**



Examining the household income and total housing costs data used to calculate rent burden has not revealed major discrepancies that could account for the observed difference among the four surveys in the percentage of renter households with severe rent burdens. The four distributions of total housing costs differ only marginally across the four surveys. With respect to the distributions of renter household income, the AHS distribution has more households at the bottom end of the income distribution. While these percentage point differences are not large, they could be significant in accounting for the higher proportion of severe rent burdens found in the AHS survey.

One observation surprised the authors, similarities among the distributions of total housing costs and household income, given what we know about the differences in questionnaires across the four surveys. The ACS gathers data on many household demographic, economic, and housing characteristics, and therefore, its questionnaire devotes the least time to questions about housing costs and household income. The AHS has the most detailed questions on housing costs, followed closely by the CEX, whereas SIPP has essentially only one question about rent and one question about utility costs.<sup>12</sup> CEX and SIPP have very detailed questions on income, but the AHS income questions are extensive and cover similar issues. While the questionnaires and data collection protocols differ substantially across the four surveys, the results in terms of renter income and housing costs distributions are quite similar.

<sup>12</sup> SIPP does ask about the contributions of various household members to rent and utilities. Page 25 of *Affordable Housing Needs: A Report to Congress on the Significant Need for Housing* (HUD's 2003 worst-case needs report) contains a table comparing the AHS and SIPP.

### **III. Consistency of Severe Rent Burdens**

#### **A. Introduction**

The second step in this investigation was to see whether households with severe rent burdens in one year also had severe rent burdens in other years, as well. The AHS permits limited multiyear analysis of rent burdens since the same units are interviewed every survey but households that move are not followed. Therefore, the AHS tracks rent burdens over time for non-movers but not for movers.

One might expect to find very few households in the AHS sample with severe rent burdens in multiple years because moving can alleviate the hardships caused by high rent burdens. However, there are four reasons why one might find severe rent burdens in successive surveys: First, while renters would likely move to cheaper units if housing prices were to rise sharply or household income were to fall substantially, this adjustment would take time because of lease commitments and the need to search for a suitable, less expensive unit. Second, the household might even resist moving if it felt that the costs and difficulty of the move outweighed the savings from finding a cheaper abode. Third, some renter households might anticipate that income shortfalls would be short lived and therefore would base their housing decision more on “permanent” income. Fourth, if severe rent burden were the result of errors in measuring rent, utility costs, or income, a move would not be expected and, in some cases, these errors might persist from survey to survey. The 2003, 2005, and 2007 public use files for the AHS allowed us to identify over 6 million renter households that were in the same unit in all 3 years.<sup>13</sup>

#### **B. Comparison of Single-Year Rent Burdens with Rent Burdens Computed over a Longer Period**

Table 6 presents frequency distributions of rent burdens for 2003, 2005, and 2007 for these households where all the necessary information was available. The table also calculates a rent burden that is the ratio of the sum of housing costs in these 3 years to the sum of household income for the 3 years.

The 2003–2007 rent burden distribution is considerably tighter than the distributions for the individual years. The bottom four rows in Table 6 report the shares of the distribution in various categories centered on the median, which was between 27 and 29 in each of the distributions. The center two categories—25 to 29 percent and 30 to 34 percent—contained approximately the same percentage of renter households in all four distributions. However, the 2003–2007 distribution contained a much larger share of the households with rent burdens between 15 and

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<sup>13</sup> In its 2003 Report to Congress on worst-case housing needs, HUD introduced analysis of the duration of rent burden. The HUD analysis was based on the SIPP data because SIPP follows households rather than housing units. See *Affordable Housing Needs: A Report to Congress on the Significant Need for Housing* at: <http://www.huduser.org/portal/publications/affhsg/affhsgneed.html>.

24 percent or between 35 and 59 percent—54 percent for the combined distribution compared to 45 percent for the individual year distributions. Likewise, the distributions for the individual years contained a larger share of the renter households in the extremes of the distributions. Only 4 percent of the households, which were in the distribution based on 2003 through 2007 AHS data, had rent burdens that were less than 5 percent or 100 percent or more, compared to 10 or 11 percent in the distributions for the individual years. To the extent that extreme rent burdens result from random shocks—sharp increases or decreases in utility costs or incomes or from one-time errors in measuring costs or incomes—then one would expect a distribution that sums across multiple surveys to have a tighter distribution.

**Table 6: Frequency Distributions of Rent Burdens for Units with Same Households: 2003, 2005, 2007, and 2003–2007<sup>14</sup>**

	2003	2005	2007	2003-07
Total in distribution	6,491,346	6,574,842	6,551,791	6,281,546
Less than 5 percent	1.3%	0.8%	1.0%	0.1%
5 to 9 percent	4.8%	3.8%	3.7%	2.9%
10 to 14 percent	11.0%	10.8%	8.8%	7.9%
15 to 19 percent	13.0%	12.6%	13.9%	15.9%
20 to 24 percent	12.7%	13.3%	10.7%	14.9%
25 to 29 percent	11.8%	11.6%	13.0%	13.5%
30 to 34 percent	9.5%	9.0%	9.3%	10.1%
35 to 39 percent	5.7%	6.0%	7.1%	7.5%
40 to 49 percent	9.0%	7.7%	8.2%	8.9%
50 to 59 percent	4.9%	4.9%	5.0%	6.3%
60 to 69 percent	2.7%	3.6%	6.6%	3.6%
70 to 99 percent	5.3%	5.2%	2.4%	4.5%
100 percent or more	8.4%	10.7%	10.1%	3.8%
Zero or negative income	191,805	108,309	131,360	401,605
Total	6,683,151	6,683,151	6,683,151	6,683,151
25 to 34 percent	21.3%	20.6%	22.3%	23.7%
15 to 24 or 35 to 59 percent	45.2%	44.5%	45.1%	53.5%
Less than 15% or 60% or more	33.4%	34.8%	32.7%	22.8%
Less than 5% or 100% or more	9.7%	11.5%	11.1%	3.9%

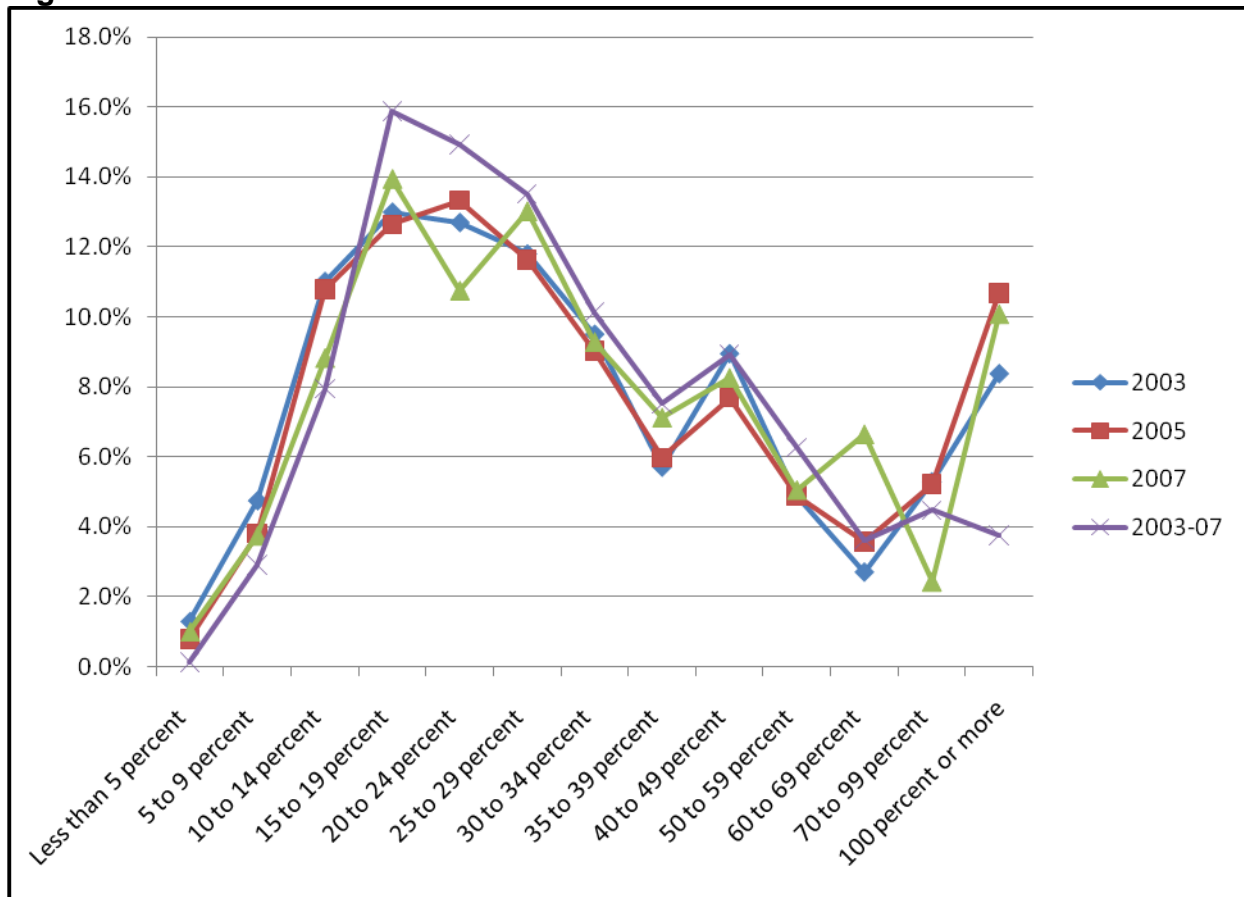
Another interesting facet of Table 6 is that the number of households with zero or negative income when income is summed over the 3 years is just slightly smaller than the sum of those with zero or negative incomes in the individual years (401,605 versus 431,473). This means that having zero or negative income in multiple surveys is rare. Also, mathematically, this means

<sup>14</sup> Because this analysis eliminates renter households who moved and therefore excludes those who moved because of severe rent burdens, the percentage in Table 6 of rental households in 2007 with severe rent burdens is smaller than the percentage in Table 3 that included all renters—24.2 percent versus 28.6 percent.

that when negative income occurs, the magnitude of the negative income overwhelms the positive income from the other two surveys. For high-income persons, this could be the result of large capital losses in a given year. It is more difficult to see how this could occur for households in which wages and salaries are the predominant sources of income. While measurement error is always a possibility, it seems unlikely that respondents would unintentionally give large negative values for any component of household income.

Figure 3 shows visually how the distribution of rent burden computed over multiple surveys has larger percentages in the center of the distribution and lower percentages in the tails than the distributions from individual surveys.

**Figure 3: Rent Burdens for Same Households**



Concentrating on households that did not move, and measuring rent burden for all three survey years combined, reduced the percentage of households at the extreme of the distribution. Only 3.9 percent of the renter households in this analysis spent their entire income or more on housing. The individual year distributions have a higher proportion of extreme cases, because some extreme cases represent temporary drops in income or spikes in housing costs or result from errors in measuring housing costs or household income.

The combined 2003–2007 distribution shows that 18.1 percent of these households had rent burdens equal to or greater than 50 percent over the period. While smaller than the percentages

in each of the individual years, the combined distribution still has roughly one in five rental families *who remained in the same rental unit* as having a severe rent burden over the period.

### C. Movement between Rent Burden Classes

Table 7 looks at the temporal consistency of the rent burden measure in another way. Using the units with the same households in all three surveys, we looked at the survey-to-survey movement among the three rent burden classes: normal, moderate, and severe. Of the 6.3 million renter households for which we had information for all 3 years, only 38.1 percent were in the same rent burden class in all 3 years. The percentage that had severe rent burden in all 3 years was 5.4 percent.

**Table 7: Movement across Rent Burden Classes among Renters Who Did Not Move, 2003–2007**

Rent burden class same in all 3 years	38.1%
Always normal burden	28.8%
Always moderate burden	3.8%
Always severe burden	5.4%
Rent burden class not same in all 3 years	61.9%
Normal burden 2 out of 3 years	25.8%
Moderate burden 2 out of 3 years	13.5%
Severe burden 2 out of 3 years	12.9%
Different burden in each year	9.7%

The relatively small percentage of households with severe rent burden in all three surveys would appear to lessen the policy concern that reliance on only one year of data creates. However, 12.9 percent had severe rent burdens in 2 out of 3 years. Approximately one out of the five renter households in this analysis experienced severe rent burdens in 2 or more years.<sup>15</sup>

The finding that close to 20 percent of non-moving renters have severe rent burdens in 2 out of 3 years or 3 out of 3 years led us to look more closely at these cases. There were 417 sample cases that displayed this characteristic, representing 1,150,000 renter households. Table 8 records the frequency with which these renter households had rent burdens of 100 percent or more. While only 0.3 percent of renter households that remained in the same unit had rent burdens of 100 percent or more in all three surveys, 4.9 percent had rent burdens of 100 percent or more in at least two out of three surveys; and 11.5 percent had rent burdens of 100 percent or more in at least one survey.

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<sup>15</sup> For another analysis of rent burden over time, see: Scott Susin, “Duration of Rent Burden as a Measure of Need,” in *Cityscape: A Journal of Policy Development and Research*, Volume 9, Number 1, 2007, U.S. Department of Housing and Urban Development. Susin uses SIPP data for 2001 through 2003 and looks at movement into and out of severe rent burden, reasons for movement out of severe rent burden, characteristics of households by rent burden, and predictors of movement out of severe rent burden.



**Table 8: Rent Burdens of 100 Percent or More among Renters with Severe Rent Burdens in 2 out of 3 or 3 out of 3 Surveys**

Renter households who remained in unit for all 3 surveys	6,281,546	Percent
Number of these renter households with severe rent burdens in 2 out of 3 or 3 out of 3 surveys	1,150,103	18.3%
Rent burden is 100 percent or more in all 3 surveys	20,756	0.3%
Rent burden is 100 percent or more in 2 out of 3 surveys	288,338	4.6%
Rent burden is 100 percent or more in 1 out of 3 surveys	412,859	6.6%
Rent burden is 100 percent or more in none of 3 surveys	428,151	6.8%
Subtotal	1,150,103	18.3%

#### **D. Characteristics of Households with Severe Rent Burdens on a Consistent Basis**

As part of the assignment from HUD, we were asked to examine the characteristics of households with severe rent burdens. Because households move into and out of the various rent burden classes from survey to survey, we decided to look at the 2007 characteristics of groups defined by their rent burden status over the 2003, 2005, and 2007 surveys. This decision shifted the analysis from all 35 million renter households in 2007 to the 6.3 million renter households who remained in the same unit in all three surveys.

The tables in this section use four new groupings: renter households with normal rent burdens in all three surveys or two out of three surveys, renter households with moderate rent burdens in all three surveys or two out of three surveys, renter households with severe rent burdens in all three surveys or two out of three surveys, or renter households with different rent burdens in each survey. The sample sizes for the four groups are: 1261, 399, 417, and 224, respectively. The tables use weighted data.

Table 9 shows, not unexpectedly, that income is closely related to rent burden. Those households in the mostly severe grouping have substantially lower incomes than any of the other groupings. The median income of the mostly normal group is almost four times the magnitude of the median of the mostly severe group.

**Table 9: Income Distribution by Rent Burden Pattern, 2003–2007**

Household income	Mostly normal	Mostly moderate	Mostly severe	All 3 classes	All
Less than \$5,000	2.5%	2.6%	19.7%	15.5%	7.0%
\$5,000 to \$9,999	7.8%	13.0%	22.6%	15.4%	12.2%
\$10,000 to \$14,999	7.8%	13.6%	22.6%	11.8%	12.0%
\$15,000 to \$19,999	4.9%	14.7%	12.4%	13.7%	8.8%
\$20,000 to \$24,999	4.3%	13.6%	5.1%	9.0%	6.5%
\$25,000 to \$29,999	8.1%	13.7%	7.5%	9.5%	9.1%
\$30,000 to \$34,999	6.6%	7.0%	2.1%	8.0%	6.0%
\$35,000 to \$39,999	5.2%	4.9%	1.5%	2.1%	4.1%
\$40,000 to \$49,999	13.3%	5.9%	1.8%	6.5%	9.2%
\$50,000 to \$59,999	9.3%	4.7%	1.9%	1.7%	6.4%
\$60,000 to \$79,999	15.8%	3.9%	1.8%	1.8%	9.8%
\$80,000 to \$99,999	6.5%	2.2%	0.8%	0.9%	4.1%
\$100,000 to \$119,999	3.1%	0.2%	0.0%	1.5%	1.8%
\$120,000 or more	4.9%	0.1%	0.3%	2.4%	2.9%
	100.0%	100.0%	100.0%	100.0%	100.0%
Median	\$ 42,101	\$22,236	\$ 11,695	\$ 17,639	\$ 26,875

Table 10 presents demographic characteristics by rent burden pattern. The mostly severe burden group has a somewhat lower percentage of households with White householders and a higher percentage of households with Black householders than the other groups. It definitely has a more elderly make-up. The median age of the householder in the mostly severe group is 61 compared to 50 for the mostly normal burden group. These relationships are probably interrelated as households with elderly or Black householders also tend to have lower household income. There are no important differences among the groups in either size of household, the presence or absence of children, or the number of children.<sup>16</sup>

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<sup>16</sup> Susin used SIPP data and categorized renters by the number of years of severe rent burden over a three year period (2001–2003). He found that those had severe rent burdens in all three years were substantially worst off along a number of economic and demographic dimensions. See: *Duration...*, op cit, page 167. Our findings are not always consistent with his. For example, we find more elderly householders among the mostly severe group, while Susin did not find that age of householder varied substantially across his categories.

**Table 10: Demographic Characteristics by Rent Burden Pattern, 2003–2007**

<b>Race/Ethnicity</b>	<b>Mostly normal</b>	<b>Mostly moderate</b>	<b>Mostly severe</b>	<b>All 3 classes</b>	<b>All</b>
White alone	72.5%	72.9%	64.9%	69.2%	70.8%
Black alone	18.9%	17.8%	25.1%	24.0%	20.3%
American Indian or Alaska Native alone	1.0%	1.0%	1.9%	1.8%	1.3%
Asian alone	5.5%	4.9%	5.6%	4.6%	5.3%
Pacific Islander alone	0.2%	1.9%	0.2%	0.5%	0.5%
Two or more races	1.9%	1.6%	2.2%	0.0%	1.7%
	100.0%	100.0%	100.0%	100.0%	100.0%
Hispanic or Latino (any race)	17.0%	25.0%	20.1%	22.0%	19.4%
<b>Age</b>					
Under 25 years	1.2%	1.3%	1.1%	1.7%	1.2%
25 to 29	5.2%	5.8%	4.0%	3.2%	4.9%
30 to 34	9.3%	5.6%	3.8%	9.3%	7.7%
35 to 44	22.9%	19.4%	14.9%	18.0%	20.4%
45 to 54	24.8%	17.3%	17.1%	17.5%	21.4%
55 to 64	18.1%	16.5%	15.1%	18.0%	17.2%
65 to 74	9.4%	14.1%	15.7%	11.3%	11.6%
75 years and over	9.1%	19.9%	28.3%	21.1%	15.7%
Median	50	55	61	55	52
<b>Size of household</b>					
1 person	41.4%	47.4%	51.0%	46.9%	44.7%
2 persons	26.7%	23.1%	24.6%	21.3%	25.1%
3 persons	13.1%	11.1%	11.1%	13.4%	12.4%
4 persons	10.2%	10.3%	7.5%	7.2%	9.5%
5 persons	4.3%	6.0%	3.8%	6.9%	4.8%
6 persons	2.5%	1.5%	0.8%	2.8%	2.0%
7 persons or more	1.7%	0.7%	1.1%	1.5%	1.4%
<b>Number of children</b>					
None	73.5%	70.9%	73.4%	72.0%	72.9%
1	12.5%	12.0%	11.2%	10.0%	12.0%
2	8.0%	11.2%	9.3%	8.9%	8.9%
3	3.6%	3.6%	4.8%	5.2%	4.0%
4	1.7%	2.1%	0.6%	3.0%	1.7%
5	0.3%	0.2%	0.5%	0.8%	0.4%
6 or more	0.3%	0.0%	0.2%	0.2%	0.2%

Table 11 examines the location of rent units by rent burden pattern. There are some interesting location patterns. The Northeast has higher than average proportions of the mostly severe burden group and the all three classes group. The mostly moderate group is overrepresented in

the West. The all three classes group is underrepresented in the Midwest. The mostly severe burden group is overrepresented in metropolitan areas and in urban areas. It is underrepresented in non-metropolitan areas and in rural areas.

**Table 11: Location of Rental Units by Rent Burden Pattern, 2003–2007**

Region	Mostly normal	Mostly moderate	Mostly severe	All 3 classes	All
Northeast	29.6%	28.1%	34.9%	35.7%	30.9%
Midwest	22.4%	17.6%	16.4%	13.3%	19.6%
South	23.1%	20.4%	24.5%	25.9%	23.1%
West	24.9%	33.8%	24.3%	25.1%	26.4%
<b>Metro/Non-metropolitan</b>					
In metropolitan area	85.1%	86.9%	90.2%	84.5%	86.3%
In a central city	49.4%	45.8%	47.7%	49.3%	48.5%
In a suburb	35.6%	41.1%	42.5%	35.2%	37.8%
In a non-metropolitan area	14.9%	13.1%	9.8%	15.5%	13.7%
<b>Urban/Rural</b>					
Urban	86.8%	90.3%	92.0%	88.8%	88.5%
Rural	13.2%	9.7%	8.0%	11.2%	11.5%

Table 12 compares the rent burden pattern groups by structural and unit characteristics. Most of the differences between the groups are minor. The mostly severe burden group had a higher proportion of its units in multifamily structures than the other groups, 55 percent versus 50 or 51 percent. The mostly severe burden group had a smaller percentage of units built in 1990 or later, but there was almost no difference in median year built across the groups.

The most striking difference is the higher percentage of units with moderate physical problems and with severe physical problems among the units in the mostly severe rent burden group. Only 85.6 percent of the mostly severe burden units were considered adequate compared to over 90 percent for all the other groups.

**Table 12: Structure and Unit Characteristics by Rent Burden Pattern, 2003–2007**

<b>Structure type and size</b>	<b>Mostly normal</b>	<b>Mostly moderate</b>	<b>Mostly severe</b>	<b>All 3 classes</b>	<b>All</b>
Mobile home	0.8%	0.9%	0.4%	1.3%	0.8%
Single-family, detached	21.3%	19.3%	16.8%	16.7%	19.7%
Single-family, attached	4.6%	5.0%	2.9%	5.6%	4.5%
2-4 unit structures	23.2%	23.5%	24.8%	26.2%	23.8%
5-9 unit structures	12.2%	12.5%	13.3%	15.6%	12.8%
10-19 unit structures	12.8%	8.9%	11.6%	7.3%	11.4%
20-49 unit structures	10.3%	13.2%	12.8%	9.6%	11.2%
50+ unit structures	14.7%	16.8%	17.4%	17.7%	15.9%
Multifamily (5+unit) structure	50.1%	51.3%	55.0%	50.2%	51.2%
<b>Year built</b>					
1990 to 2003	25.8%	23.0%	20.5%	21.2%	23.9%
1975 to 1989	33.3%	30.8%	34.6%	37.0%	33.5%
1960 to 1974	25.2%	27.1%	27.4%	29.1%	26.3%
1940 to 1959	10.2%	10.5%	9.7%	6.8%	9.8%
1939 or earlier	5.5%	8.7%	7.9%	5.9%	6.5%
Median	1977	1979	1978	1977	1977
<b>Number of bedrooms</b>					
None	2.6%	1.7%	1.3%	1.4%	2.1%
1	33.1%	39.2%	37.5%	33.6%	35.0%
2	40.8%	42.7%	41.1%	39.2%	41.0%
3	19.9%	13.7%	17.1%	22.5%	18.6%
4	2.8%	2.5%	2.3%	2.6%	2.7%
5 or more	0.8%	0.2%	0.7%	0.8%	0.7%
<b>Adequacy of unit</b>					
Adequate	91.6%	92.1%	85.6%	90.1%	90.5%
Moderate physical problems	5.8%	4.2%	9.6%	5.7%	6.2%
Serious physical problems	2.6%	3.7%	4.8%	4.2%	3.3%

#### ***IV. Data Issues Associated with Measuring Rent Burdens***

This section examines data issues associated with the measurement of rent burden in the hopes that these issues might offer some insight into the prevalence of very high rent burdens and the survey-to-survey variability in rent burdens. First, we look at information on the extent of edits and allocations in the variables used to compute rent burden. Second, we make use of special data the AHS collects when rent burdens seem excessive. These data can be used to investigate whether a household receives various forms of outside assistance. Third, we investigate the volatility of the components used to compute rent burden – monthly housing costs and monthly

income. Finally, we present a simulation to test whether variability in measuring housing costs and household income can account for a meaningful share of the severe rent burdens observed in the AHS data.

## A. Edits and Allocations among Housing Costs and Income Variables

The Census Bureau routinely edits data collected from respondents to improve the accuracy of the answers. Some variables are so important that the Census Bureau will provide values for these variables if respondents fail to answer the questions. The process of providing values for missing data is called allocation. Rent, frequency of rent, utility payments, and various components of household income are variables that are subject to allocation.

Table 13 reports the extent to which the Census Bureau performed edits and allocations for rent, the frequency of rent, and the wage and salary income of the householder and of the spouse for the 2007 AHS.<sup>17</sup>

**Table 13: Edits and Allocation for Rent, the Frequency of Rent, and Wage and Salary Income**

	Rent Burden			
<b>Contract rent (RENT)</b>	Normal	Moderate	Severe	All
Neither edited or allocated	91.8%	93.0%	88.0%	91.2%
Edited	0.0%	0.0%	0.0%	0.0%
Allocated	8.2%	7.0%	12.0%	8.8%
	100.0%	100.0%	100.0%	100.0%
<b>Frequency of rent payments (FRENT)</b>	Normal	Moderate	Severe	All
Neither edited or allocated	81.0%	84.0%	80.0%	81.5%
Edited	10.8%	9.0%	8.0%	9.6%
Allocated	8.2%	7.0%	12.0%	8.8%
	100.0%	100.0%	100.0%	100.0%
<b>Wage and salary income of householder</b>	Normal	Moderate	Severe	All
Neither edited or allocated	78.8%	81.1%	84.0%	80.6%
Edited	1.6%	2.0%	4.1%	2.3%
Allocated by hot deck	14.7%	9.4%	8.8%	12.0%
Allocated by some other way	5.0%	7.4%	3.0%	5.1%
	100.0%	100.0%	100.0%	100.0%
<b>Wage and salary income of spouse</b>	Normal	Moderate	Severe	All
Neither edited or allocated	68.3%	79.4%	87.9%	76.0%
Edited	2.9%	3.3%	3.8%	3.2%
Allocated by hot deck	25.3%	11.2%	5.5%	16.8%
Allocated by some other way	3.6%	6.1%	2.9%	4.0%

<sup>17</sup> The techniques used by the Census Bureau to produce values for the costs of electricity and gas involve regression smoothing that applies to all cases, and allocations are frequent for other utility costs. See page 12 of *Streamlining the American Housing Survey* at: <http://www.huduser.org/portal/datasets/ahs.html>.

	100.0%	100.0%	100.0%	100.0%
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Allocations of both contract rent and the frequency of rent payments occurred more frequently for units with severe rent burdens. This may be significant because allocations tend to push values toward the middle of the distribution. If rents are allocated for lower income households, then the allocation process could lead to higher rent burdens. Allocations of wage and salary income for both the householder and the spouse occurred more frequently for units with normal rent burdens. This pattern of allocations may also be significant. Table 14 will show that household income is extremely variable from survey to survey. The allocation process may have dampen survey-to-survey swings, and therefore lessen the probability that these swings would transform a unit with normal rent burden into a unit with a severe rent burden.

While the pattern of allocations of rent and income may contribute to high proportion of households with severe rent burdens, the relatively infrequent occurrence of allocations suggests that the allocation process is not a major contributor.

## B. RATIOV Variables

HUD and the Census Bureau are aware of the incongruity of households spending more than 100 percent of their incomes on housing. So in some survey years, the Census Bureau asks additional questions of respondents if the rent burden exceeds certain tolerances. The responses to these questions are kept in a separate file called RATIOV. The Census Bureau asks the RATIOV questions of two subsets of renters: (1) renters, who appear, on the basis of their answers, to live in assisted housing and whose rent burdens exceed 35 percent, and (2) renters whose rent burdens exceed 50 percent and whose annual income is less than or equal to \$15,000.

Table 14 presents the results from analysis of these variables from the 2005 survey, for each of the two subsets questioned.<sup>18</sup> The table reports the percentage of cases among all renter households in that subset who were asked the question and responded positively. Because the rent burden threshold is 35 percent for asking the questions of renters who appear to live in assisted housing, the top panel contains only households with moderate or severe rent burdens. The severe rent burden group is further divided into three groups. The bottom panel deals with households with rent burdens over 50 percent, and therefore, all the questioned households had severe rent burdens.

The first column in each panel reports the percentage who report receiving assistance with rent payments; the second column reports the percentage who report receiving assistance with both rent and utilities; and the third column reports the percentage who report receiving any of eight categories of assistance. The categories are: rent, utilities, transportation, groceries, medicine, children, clothing, and other.

The AHS Codebook gives the following approximate wording for all of the variables in RATIOV: “In these difficult economic times, many people have trouble making ends meet. Do

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<sup>18</sup> We can only approximate the subsets that were asked the RATIOV questions because we do not have code used by the Census Bureau. We do know that the code makes use of at least one variable not on the public use file.

you receive any EXTRA {emphasis in Codebook} help from people or groups outside the household to meet your monthly expenses, such as help with ....” With respect to rent, we presume respondents interpret this as “assistance” in addition to the assistance they receive from living in assisted housing. Therefore, it is not surprising that only 11.0 percent of the households who appear to live in assisted housing and have severe rent burden report receiving “assistance” with rent. Among assisted renters with severe rent burdens, 21 percent receive some type of outside assistance. Similarly, for renters with severe rent burdens and income less than or equal to \$15,000, 9.1 percent received assistance with rent and 20.9 percent received some type of outside assistance.

**Table 14: Analysis of AHS Questions on Receiving Assistance from 2005 AHS**

<b>Rent burden &gt; 0.35 and in assisted housing</b>	<b>Assistance with rent</b>	<b>Assistance with rent and utilities</b>	<b>Assistance of some kind</b>
Moderate burden	0.7%	0.3%	1.7%
Severe burden	11.0%	4.3%	21.0%
Moderate burden	0.7%	0.3%	1.7%
50% < Rent burden < 70%	7.8%	3.8%	17.2%
70% ≤ Rent burden < 100%	11.9%	6.2%	24.0%
100% ≤ Rent burden	12.7%	3.9%	22.2%
All units in group	7.0%	2.7%	13.5%
<b>Rent burden &gt; 0.5 and 0 &lt; income &lt; \$15,000</b>	<b>Assistance with rent</b>	<b>Assistance with rent and utilities</b>	<b>Assistance of some kind</b>
Severe burden	9.1%	4.1%	20.9%
50% < Rent burden < 70%	5.8%	2.1%	21.6%
70% ≤ Rent burden < 100%	8.3%	3.9%	21.3%
100% ≤ Rent burden	11.0%	5.1%	20.3%
All units in group	9.1%	4.1%	20.9%

The RATIOV variables appear to be sensitive to rent burden. The proportions receiving assistance in each of the three columns of the upper panel are substantially larger for those with severe burdens than for those with moderate burdens. In both panels, among those with severe rent burdens, those with burdens of 70 percent or more but less than 100 percent received more assistance than those with rent burdens of more than 50 percent but less than 70 percent. For assistance with rent, those with rent burdens of 100 percent or more had the highest proportion receiving assistance. These results are encouraging because they indicate that some households with severe rent burdens are receiving help that would enable them to increase their consumption of non-housing goods and services. They also serve to provide limited legitimacy to percentages that, without outside assistance, would appear to require an almost impossible imbalance between housing and other consumption. The added legitimacy is limited because, at most, fewer than 25 percent of the households with severe rent burden, even those whose housing costs exceed their income, receive some extra assistance.



## C. Survey-to-Survey Variation in Housing Costs and Household Income

Having observed frequent survey-to-survey changes in rent burden for the same households in the same rental units, we now examine the extent to which the components used to calculate rent burden—monthly housing costs and monthly household income—vary across surveys.

### Measures of Variation

To do this, we devised two measures of survey-to-survey variation, which appear in rows 5 and 6 of Table 15. Rows 1 through 4 of Table 15 contain intermediate steps in computing the measures. The text box on the following page uses an actual case from the AHS sample to illustrate how we calculated all the rows in Table 15.

**Table 15: Analysis of Variation by Unit in Monthly Housing Costs and Monthly Household Income across Surveys: 2003, 2005, and 2007**

	All rental units with same households (2,300 sample units)	Monthly housing costs	Monthly household income
1	Average of unit averages over 2003, 2005, & 2007	\$737.93	\$2,981.82
2	Average across units of percent 2003 different from unit average	-6.4%	-2.0%
3	Average across units of percent 2005 different from unit average	-0.2%	-2.0%
4	Average across units of percent 2007 different from unit average	6.6%	3.9%
5	Median of average absolute percentage differences by unit	9.3%	26.3%
6	Median of maximum difference in values across 3 years as percent of average value by unit	23.4%	64.7%

The averages across all units (row 1) of the individual unit averages calculated over the three surveys were \$737.93 for monthly housing costs and \$2,981.82 for monthly household income. Row 2 shows that the average percentage deviation between the unit value in 2003 and the unit average was -6.4 percent for monthly housing costs and -2.0 percent for monthly household income. Rows 3 and 4 provide similar information for 2005 and 2007. On average, there appears to have been a smooth progression in values between 2003 and 2005. Rows 5 and 6, however, show that the averages hide substantial unit-by-unit variation, particularly for monthly household income.

Row 5 reports the medians of the averages computed for each unit of the absolute percentage differences across the three surveys. For half of all units, the average absolute difference for monthly housing costs exceeded 9.3 percent. For half of all units, the average absolute difference for monthly household income exceeded 26.3 percent.

Row 6 shows even more dramatic variation across surveys. For half of all units, the ratio of the difference between the largest and the smallest values reported for monthly housing costs to the average of the three values exceeded 23.4 percent. For half of all units, the ratio of the

difference between the largest and the smallest values reported for monthly household income to the average of the three values exceeded 64.7 percent.

## Derivation of Measures of Survey-to-Survey Variation

Example case: AHS CONTROL number = 447929790149

Case average values	2003	2005	2007	Average used in Row 1
Monthly housing costs	\$606	\$671	\$789	\$689
Monthly household income	\$2,300	\$2,500	\$5,008	\$3,269

Row 1 of Table 15 contains the averages computed across all cases of the individual case averages in the far right column above.

After computing average monthly housing costs and monthly household income for each case, we computed the percentage difference between the value in each year and the average value. For example,  $(\$606 - \$689)/\$689 = 12.0\%$  is the row-2 value for monthly housing costs and  $(\$2,300 - \$3,269)/\$3,269$  is the row-2 value for monthly household income.

Case percentage differences from average value	2003 percentage difference used in Row 2	2003 percentage difference used in Row 3	2003 percentage difference used in Row 4
Monthly housing costs	-12.0%	-2.6%	14.6%
Monthly household income	-29.7%	-23.5%	53.2%

Rows 2, 3, and 4 of Table 15 contain the averages computed across all cases of the individual case percentage difference in the columns above.

Notice that arithmetically each row in the above table must sum to zero. For this reason, we use the sum of the *absolute* differences to compute the first measure in Row 5—the average absolute difference.

Row 5 values:

Monthly housing costs:  $(12.0\% + 2.6\% + 14.6\%)/3 = 9.7\%$

Monthly household income:  $(29.7\% + 23.5\% + 53.2\%)/3 = 35.5\%$

Row 5 of Table 15 contains the median across all cases of the individual case averages computed above.

For row 6, we subtract the smallest of the three values from the largest and divide by the average values.

Row 6 values:

Monthly housing costs:  $(\$789 - \$606)/\$689 = 26.6\%$

Monthly household income:  $(\$5,008 - \$2,300)/\$3,269 = 82.8\%$

Row 6 of Table 15 contains the median across all cases of the individual ratios computed above.

The example in the text box illustrates the observed case-by-case variation. In the example, the row-5 values for the case are 9.7 percent for monthly housing costs and 35.5 percent for monthly household income. The row-6 values are 26.6 percent for monthly housing costs and 82.2 percent for monthly household income.

The observed survey-to-survey variation in the components used to calculate rent burden explains the movement among rent burden classes reported in Table 7. Table 16 reports row 5 of Table 15 for the seven mutually exclusive subsets in Table 7.

**Table 16: Variation across Surveys by Rent Burden History**

	Number of sample units	Median of average absolute percentage differences in monthly housing costs by unit	Median of average absolute percentage differences in monthly household income by unit
All rental units with same households	2,300	9.3%	26.3%
Always normal burden	670	7.1%	13.8%
Always moderate burden	90	5.8%	9.0%
Always very moderate burden	129	9.3%	31.5%
Normal burden 2 out of 3 years	590	10.7%	31.8%
Moderate burden 2 out of 3 years	309	8.3%	22.3%
Very moderate burden 2 out of 3 years	288	12.9%	51.7%
Different burden in each year	224	11.4%	47.7%

Table 16 confirms that the households with similar rent burdens across surveys are the households that also have less survey-to-survey variation in monthly housing costs and monthly household income. Households with moderate rent burdens in all three survey years experienced the least variation in both monthly housing costs and monthly household income: The medians calculated based on variation in monthly housing costs were 5.8 percent for this group, compared to 9.3 percent for all units; and the medians calculated based on variation in monthly household income were 9.0 percent compared to 26.3 percent.<sup>19</sup> On the other hand, the group of households that were in a severe rent burden class in two of the three surveys had the largest variation: The median calculated based on variation in monthly housing costs was 12.9 percent, compared to 9.3 percent for all units; and the median calculated based on variation in monthly household income was 51.7 percent, compared to 26.3 percent.

### **Impact of Outliers on the Measures of Variation**

Table 17 explores the possibility that the observed variation is the result mainly of outlier cases. There are 2,300 cases where the unit is rental and occupied by the same household in 2003, 2005, and 2007; of these, 296 cases have a measured rent burden in of 2.0 or more at least once during the three surveys.

<sup>19</sup> The always moderate rent burden group have rent burdens that fall into a narrow range (30% < but < 50%). This probably explains why its members have the least variation in the two components used to calculate rent burden, because large variation would likely result in not having moderate rent burden in one or more years.

**Table 17: Comparison of Key Summary Statistics before and after Eliminating Outliers**

<b>All cases (n=2,301)</b>	<b>Average</b>	<b>Standard deviation</b>	<b>Median</b>	<b>First quartile</b>	<b>Third quartile</b>	<b>Interquartile range</b>
Average monthly housing costs across 3 surveys	\$738	\$402	\$680	\$483	\$903	\$420
Average monthly household income across 3 surveys	\$2,982	\$2,641	\$2,342	\$1,271	\$3,948	\$2,677
Maximum difference in monthly housing costs across 3 surveys/average monthly housing costs	40.5%	42.3%	23.4%	12.7%	51.7%	39.0%
Maximum difference in monthly household income across 3 surveys/average monthly household income	78.9%	58.2%	64.7%	31.8%	116.6%	84.8%
Maximum difference in rent burden across 3 surveys	3346.2%	67716.9%	21.0%	9.0%	58.0%	49.0%
Maximum difference in rent burden/average rent burden	93.8%	73.7%	73.8%	36.7%	131.3%	94.6%
<b>All cases where maximum rent burden less than 2.0 (n=2,004)</b>	<b>Average</b>	<b>Standard deviation</b>	<b>Median</b>	<b>First quartile</b>	<b>Third quartile</b>	<b>Interquartile range</b>
Average monthly housing costs across 3 surveys	\$745	\$390	\$691	\$502	\$905	\$404
Average monthly household income across 3 surveys	\$3,221	\$2,660	\$2,601	\$1,518	\$4,121	\$2,603
Maximum difference in monthly housing costs across 3 surveys/average monthly housing costs	38.4%	39.9%	22.5%	12.4%	49.5%	37.1%
Maximum difference in monthly household income across 3 surveys/average monthly household income	65.9%	47.5%	56.3%	28.4%	92.8%	64.4%
Maximum difference in rent burden across 3 surveys	28.6%	31.7%	17.0%	8.0%	37.0%	29.0%
Maximum difference in rent burden/average rent burden	73.3%	51.5%	63.2%	32.0%	102.8%	70.8%

Table 17 reports key summary statistics on average monthly housing costs and household income, the row-6 measure of variation in monthly housing costs and household income, and two measures of variation in rent burden. The top half of the Table uses all 2,300 cases; the bottom uses the 2,004 cases left after eliminating all cases where rent burden equaled or exceeded 2.0 in any of the survey years.

The first measure of variation for rent burden is simply the difference between the largest and the smallest rent burden. This measure appears in the fifth row of the both the top and bottom panels of Table 17. The measure clearly demonstrates the impact of outliers. The average difference for the entire sample is an incredible 3346.2 percent, where 100 percent would mean that the difference between the largest and smallest rent burden was approximately equal to average income! Eliminating outliers reduces this measure to a large, but reasonable 28.6 percent.

The second measure of variation for rent burden is patterned after the row-6 measure in Table 15. For each unit, we subtract the smallest rent burden from the largest and divide the difference by the average rent burden.

Eliminating outliers had the effect of raising the average, median, and quartile values for both monthly housing costs and monthly household income. Outliers occurred more frequently among lower cost units and units occupied by lower income families. Despite improvement in standard deviations and interquartile ranges, the smaller sample still displays a great deal of variation. Half of the 2,004 units had ratios of the maximum difference in monthly housing costs to average monthly housing costs in excess of 22.5 percent compared to 23.4 percent for the full sample. Half of the 2,004 units had ratios of the maximum difference in monthly household income to average monthly household income in excess of 56.3 percent compared to 64.7 percent for the full sample.

### **Reasons for Variation in Housing Costs and Household Income**

Explaining the substantial survey-to-survey variation in these key variables is beyond the scope of this research. However, we can discuss some general issues related to the observed variation. By definition, they are some combination of actual changes in housing costs and household income and errors in reporting housing costs and household income.

Monthly housing costs are the sum of cash rent, the costs of any utilities paid by the tenants, and the cost of rental insurance, if purchased. One would expect year-to-year increases in rent, but only modest increases for sitting tenants. Utility costs can vary substantially from year to year. In addition, getting accurate information on utility costs has been a perennial problem for the AHS. So the combination of actual variation in utility costs plus the problems of eliciting accurate information on utility costs probably accounts for most of the variation in monthly housing costs across surveys.

Household income is also subject to both real survey-to-survey variation and measurement difficulties. Lower income families often have unstable income, for example, a family member might work some years and not others or there might be spells of unemployment or the amount

of overtime work might fluctuate.<sup>20</sup> Higher income families may experience fluctuations in investment income. Multiple sources of income, fluctuations in income, and the natural reluctance of households to reveal their income make it difficult for any survey to collect reliable information on income. In addition, the AHS changed its income questions between 2003 and 2005 and then made further minor changes in 2007.<sup>21</sup> These changes may have caused unusual variation in income during the period studied.

### **Correlations between Variation and Levels of Housing Costs and Household Income**

Table 18 looks for relationships between either the level of housing costs or the level of household income and variations in housing costs, household income, and rent burden across surveys. The table compute correlation coefficients for the full sample of 2,300 cases and the 2,004 case sample created by elimination of 296 outliers.

**Table 18: Relationships among the Level of Housing Costs and Household Income and Variations in Housing Costs, Household Income, and Rent Burden**

	<b>Average monthly housing costs</b>	<b>Average monthly household income</b>
<b>All cases (n=2,300)</b>		
Average monthly housing costs across 3 surveys	1.000	
Average monthly household income across 3 surveys	0.543*	1.000
Maximum difference in monthly housing costs across 3 surveys/average monthly housing costs	0.002	-0.066*
Maximum difference in monthly household income across 3 surveys/average monthly household income	0.037	-0.038
Maximum difference in rent burden across 3 surveys	0.090*	-0.031
Maximum difference in rent burden/average rent burden	-0.006	-0.120*
	<b>Average monthly housing costs</b>	<b>Average monthly household income</b>
<b>All cases where maximum rent burden less than 2.0 (n=2,004)</b>		
Average monthly housing costs across 3 surveys	1.000	
Average monthly household income across 3 surveys	0.594*	1.000
Maximum difference in monthly housing costs across 3 surveys/average monthly housing costs	-0.016	-0.044*
Maximum difference in monthly household income across 3 surveys/average monthly household income	0.120*	0.122*
Maximum difference in rent burden across 3 surveys	0.080*	-0.200*
Maximum difference in rent burden/average rent burden	0.065*	0.058*

\* Statistically different than 0 at the 95-percent level of confidence.

<sup>20</sup> Footnote 24 in *Affordable Housing Needs: A Report to Congress on the Significant Need for Housing* contains a useful summary of a study by Iceland on movements into and out of poverty.

<sup>21</sup> For a discussion of the 2005 changes, see: Scott Susin, *Evaluation of the 2005 Changes in the AHS Income Questionnaire*, September 18, 2007, U.S. Department of Housing and Urban Development.

The correlation between monthly housing costs and monthly household income is a robust 0.543 in the full sample and 0.594 in the reduced sample. Still differences in income account for less than 36 percent of the observation variation in housing costs. Differences in tastes for housing, differences in the costs of housing across places, and difficulties in accurately measuring costs and income account for some of the remaining variation.

Average monthly household income has a modest relationship to the maximum difference between rent burdens over the three surveys for the reduced sample, but not for the full sample. The correlation is -0.20, which is statistically significant and indicates that higher income is modestly associated with smaller measured differences between the highest rent burden and the lowest rent burden. When the maximum difference is scaled by the average rent burden, the correlation changes sign and falls in absolute value to 0.058.

Average monthly household income has a weak relationship to the variation in monthly household income. For the full sample, higher income households are less likely (correlation = -0.066) to have large relative variation in household income. For the reduced sample, the correlation is higher but the direction of the association is different. For this sample, higher income households are more likely (correlation = 0.120) to have large relative variation in household income.

The level of monthly housing costs has no measurable relationship to relative variation in monthly housing cost; the correlations are small and statistically insignificant in both samples. Nevertheless, more costly units are slightly more likely to have larger maximum differences in rent burdens. While statistically significant, the correlations never exceed 0.090.

Neither the existence of outliers nor the level of housing costs or household income account for any substantial portion of the observed variation in housing costs or household income.

#### **D. Simulating the Effects of Variability in Housing Costs and Household Income on Rent Burden**

To examine the possibility that natural variability or measurement errors could contribute to the high proportion of households with severe rent burdens, we performed a simple simulation.

Appendix D explains the simulation in detail. The essential features are:

1. We assume that there are 10,000 households.
2. These households have one of three “expected” values for rent burden: 4,000 at 25 percent; 2,000 at 35 percent; and 4,000 at 45 percent.
3. We assume that the errors in measuring income are normally distributed with a mean of zero and a standard deviation of 25 percent of the true income, and the errors in measuring gross rents are normally distributed with a mean of zero and a standard deviation of 12.5 percent of the true gross rent.

The first assumption is simply a scale assumption and has no effect on the outcome. The second assumption is the essence of the simulation, which seeks to portray the observed wide distribution of rent burdens as the product of variability resulting from legitimate survey-to-survey changes or from measurement error. Since the result depends heavily on how many of the households with the highest expected rent burdens are pushed into the severe rent burden range, both the number of households in this group and the expected rent burden are crucial numeric assumptions. Examination of the distribution in Table 1 of renter households shows that this is a conservative assumption. The third assumption posits substantial variability in total housing costs and very substantial variability in household income. This assumption is equivalent to assuming that 2/3s of household incomes are measured within 25 percent of the correct value and 2/3s of gross rents within 12.5 percent of the correct value. Table 14 shows that half of the household income values are 26.3 percent or more from the 3-year average and half of the housing costs values are 9.3 percent or more from the 3-year average. We take this information as confirmation that this assumption is reasonable.

Table 19 compares the results of this simple simulation to the observed pattern in 2007. The simulation assumed that no household had an expected rent burden less than 25 percent or more than 45 percent. But when variability was introduced, the results found 8.2 percent with rent burdens less than 20 percent and 17.8 percent with rent burdens of 50 percent or more.

**Table 19: Simulations of the Impact of Variability**

Percent of households with rent burdens	Simulation	Observed in 2007
Less than 20 percent	8.2%	10.8%
Equal to or greater than 50 percent	17.8%	28.6%

By itself, variability appears capable of explaining a large share of the population in the tails of the rent burden distribution.

## ***V. Assessing the Real World Impact of Rent Burden***

Analysts calculate the rent burden ratio in order to count households who are experiencing hardship because they spend too much on housing and therefore have reduced ability to satisfy non-housing wants and needs. To see if a high rent burden actually signifies hardship, we will look at the relationship between rent burden and moving decisions by renter households. If a high rent burdens truly represents a hardship, then we would expect to see the following:

- (a) households that have a high rent burden in one survey should be more likely to move prior to the next survey than households with lower rent burden, and
- (b) households that move should avoid units whose costs result in high rent burdens.

Table 20 tests proposition (a) and Table 21 tests proposition (b).

The AHS follows the same housing unit from survey to survey; it does not follow households that move. The AHS has a variable that records whether the household in a unit is the same



household as had been in the unit in the previous survey. If *any* member of the previous household is still a resident in the unit, then the AHS records this as the “same household”; if *no* member of the previous household is still a resident in the unit, then the AHS records this as a “replacement household.” We use the term “new household” instead of “replacement household” and treat occupancy by a new household as a move out of the unit by the previous household and a move into the unit by the current household. The 2007 AHS found that 35.4 percent of renter households had moved into their units within the past year.

Moves can be either voluntary or involuntary. Households move voluntarily for a variety of reasons: to find housing better suited to their needs, to reduce housing costs, to locate closer to employment, to combine or split households, e.g., marriage or divorce, or for other reasons. Often these moves result from more than one reason. Involuntary moves result from evictions, loss or damage to a unit from disasters, government displacement, or other causes. The AHS asks new households about the reasons they left their previous unit but it does not obtain similar information from households who leave a unit because it does not follow these households.

### **A. Moves and Rent Burdens Prior to Moving**

Table 20 report the percentage of households who moved between surveys differentiated by the level of rent burden reported in the preceding survey. The top panel relates the percentage of units with new households in 2005 to rent burden in 2003 while the bottom panel relates the percentage of units with new households in 2007 to rent burden in 2005.

The first column of numbers represents all renter households with calculated rent burdens and incomes greater than zero. At the all renter level, there appears to be no difference in moving behavior between the 2003 and 2005 surveys based on rent burden. Between the 2005 and 2007 surveys, renter households with moderate rent burdens in 2005 were somewhat more likely to move than households with normal rent burdens. The difference was small, 43.3 percent of renter households verses 40.4 percent. In both panels, households with severe rent burdens in the previous survey were as likely to have moved as those with normal rent burdens.

We examined this puzzling result further by eliminating from the analysis three groups: renter households with unusually high rent burdens (defined as rent burdens equal to or greater than 2.0), renter households receiving housing assistance, and renter households that fall into either of these groups. In Tables 17 and 18, we treated households with rent burdens equal to or greater than 2.0 as outliers. We drop them from the moving analysis for the same reason. We dropped assisted households because unless assistance is in the form of a voucher, moving can result in the loss of assistance; therefore, assisted households would be expected to move less frequently.<sup>22</sup> Eliminating these three groups had almost no effect on the pattern of moves by rent burden between 2003 and 2005.

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<sup>22</sup> The AHS has a well-known tendency to overcount assisted households.

**Table 20: Relationship between Rent Burden in One Survey and a Move before the Next Survey**

<b>Percent of units with new households in 2005</b>	<b>All renter households with calculated rent burdens in 2003</b>	<b>Renter households with rent burdens less than 2.0 in 2003</b>	<b>All unassisted renter households with calculated rent burdens in 2003</b>	<b>Unassisted renter households with rent burdens less than 2.0 in 2003</b>
Normal burden in 2003	45.3%	45.3%	47.0%	47.0%
Moderate burden in 2003	46.5%	46.5%	47.5%	47.5%
Severe burden in 2003	45.5%	45.8%	46.4%	46.8%
Normal burden in 2003	45.3%	45.3%	47.0%	47.0%
Moderate burden in 2003	46.5%	46.5%	47.5%	47.5%
50% < Rent burden in 2003 < 70%	47.9%	47.9%	47.9%	47.9%
70% ≤ Rent burden in 2003 < 100%	44.1%	44.1%	45.5%	45.5%
100% ≤ Rent burden in 2003	43.7%	43.6%	45.3%	46.0%
All units	45.6%	45.7%	47.0%	47.1%
Number of renter households	21,301,189	20,585,954	17,196,703	16,707,462
<b>Percent of units with new households in 2007</b>	<b>All renter households with calculated rent burdens in 2005</b>	<b>Renter households with rent burdens less than 2.0 in 2005</b>	<b>All unassisted renter households with calculated rent burdens in 2005</b>	<b>Unassisted renter households with rent burdens less than 2.0 in 2005</b>
Normal burden in 2005	40.4%	40.4%	40.9%	40.9%
Moderate burden in 2005	43.3%	43.3%	46.5%	46.5%
Severe burden in 2005	40.8%	40.7%	41.7%	41.2%
Normal burden in 2005	40.4%	40.4%	40.9%	40.9%
Moderate burden in 2005	43.3%	43.3%	46.5%	46.5%
50% < Rent burden in 2005 < 70%	40.9%	40.9%	42.3%	42.3%
70% ≤ Rent burden in 2005 < 100%	42.7%	42.7%	42.1%	42.1%
100% ≤ Rent burden in 2005	39.6%	37.9%	40.9%	38.0%
All units	41.4%	41.2%	42.7%	42.3%
Number of renter households	23,294,378	22,009,222	18,634,733	17,780,530

Removing assisted units and the combination of assisted units and outliers sharpened the difference between the moving behavior of renters with normal rent burdens and renters with moderate rent burdens. After each of these changes, the proportion of moves among households with moderate rent burdens in 2005 was 46.5 percent, compared to 40.9 percent for households with normal rent burdens. Nevertheless, for both years and for all four data sets, the differences in moving behavior between households with severe rent burdens and households with normal rent burdens were very small and sometimes negative.

Using SIPP data, Susin examined very low-income renters who had severe rent burdens in 2001 and had exited the severe rent burden status by 2002 or 2003. Declines in rent accounted for 8.1 percent of the exits by 2002 and 10.0 percent by 2003 but fewer than 40 percent of the cases where rents declined were associated with moves (2.8 percentage points of the 8.1 and 3.9 percentage points of the 10.0).<sup>23</sup>

## **B. Moves and Rent Burdens after Moves**

Table 21 compares the rent burdens for units where the household in the current survey is the same household that was in the previous surveys with the rent burdens of units where the household in the current survey is different than the household in the previous survey. Table 21 finds no meaningful differences between the two groups.<sup>24</sup> Twenty-five percent of the new renter households in 2005 and 23 percent in 2007 chose rental units whose costs put them into the severe rent burden group. These are essentially the same proportions as the proportions of households with severe rent burdens among households that did not move. Once again the results are surprising—rent burden does appear to be a factor in choosing a rent unit.<sup>25</sup>

HUD's 2003 worst-case needs report contains an analysis of very low income renters who had severe rent burdens in 2001 that compares the rent burden outcomes in 2002 of those who moved and those that stayed in the same unit.<sup>26</sup> Among those who stayed, 52.6 percent had severe rent burdens in 2002 compare to 33.0 percent among movers. Further analysis indicates that, among the movers, 64.1 percent no longer had severe rent burdens because of lower gross rent compared to 34.0 percent among those who stayed in the same unit but no longer had severe rent burdens.<sup>27</sup> This analysis suggests that reducing rent burden was an important consideration among the movers in this group. Unlike this analysis, Table 21 looks at the housing choices of all households that moved.

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<sup>23</sup> Susin, op cit, page 160.

<sup>24</sup> In Table 21, the different household column is the sum of three groups: units that had a household in the previous survey but now have a different household; units that were "usual residence elsewhere" or vacant in the previous survey and are now occupied by renters; and units that were non-interviews in the last survey or are new units. The results are essentially the same if the analysis is limited to the first group only, which comprises 60 percent of the total group.

<sup>25</sup> Table 21 focuses on all households for which we were able to calculate a rent burden and identifies whether or not the household is the same household. We ran the analysis omitting outliers (rent burdens of 2.0 or more), assisted units, and both of these groups. The results are essentially the same for each of the populations.

<sup>26</sup> Table 3-12 in *Affordable Housing Needs: A Report to Congress on the Significant Need for Housing*.

<sup>27</sup> op cit; Table 3-13 provides the counts used to calculate these percentages.

**Table 21: Rent Burdens of Units with the Same or Different Households**

	Same households	Different households
Normal burden in 2005	53.3%	51.3%
Heavy burden in 2005	23.1%	23.8%
Very heavy burden in 2005	23.6%	24.9%
	Same households	Different households
Normal burden in 2005	53.3%	51.3%
Heavy burden in 2005	23.1%	23.8%
50% < Rent burden in 2005 < 70%	8.2%	9.1%
70% ≤ Rent burden in 2005 < 100%	5.3%	5.7%
100% ≤ Rent burden in 2005	10.2%	10.0%
Units in thousands	12,499	18,495
	Same households	Different households
Normal burden in 2007	50.7%	50.9%
Heavy burden in 2007	25.0%	25.9%
Very heavy burden in 2007	24.3%	23.2%
	Same households	Different households
Normal burden in 2007	50.7%	50.9%
Heavy burden in 2007	25.0%	25.9%
50% < Rent burden in 2007 < 70%	9.0%	9.1%
70% ≤ Rent burden in 2007 < 100%	5.6%	4.7%
100% ≤ Rent burden in 2007	9.7%	9.3%
Units in thousands	14,151	17,643

If rent burden truly measures the constraint on a household's ability to meet its non-housing needs, then one would expect tightly constrained households to move to a less expensive dwelling in order to free up resources for other needs and one would also expect households who move to avoid a high rent burden situation. The only evidence of this causality in Table 20 involves the moving behavior of household with moderate rent burdens in 2005. There is no evidence of more moves among renter households with severe rent burdens. Moreover, Table 21 indicates that rent burden appears not to be a consideration in choosing a new rental unit among renter households in general. Severe rent burden appears to have no effect on either the decision to move or the choice of a new unit. The anticipated economic behavior is not observed. In the words of Sherlock Holmes, "the dog did not bark."<sup>28</sup>

## ***VI. Observations***

The rent burden concept is simple and intuitively appealing. If a household is paying too much for shelter, then other important needs are probably not being satisfied. The ratio of housing

<sup>28</sup> Our thanks to Barry Steffen for pointing out the aptness of this quote.

costs to income seems to be an appropriate measure for this concept. But, despite its appeal and wide use, the analysis in this study raises some serious questions about the policy usefulness of the rent burden concept.

Table 15 showed that measured income and measured housing costs can fluctuate substantially from one survey to the next for the same unit occupied by the same household. We cannot determine what proportion of the observed volatility results from real survey-to-survey changes in housing costs or household income or from errors in measuring housing costs and household income. Perhaps the changes in the AHS questionnaire related to income in 2005 and, to a lesser extent, in 2007 may have contributed to the excessive volatility in household income.

A simple simulation shows that volatility of the level observed could have generated a large share of the households in 2007 with very high or very low rent burdens even if no households had rent burdens less than 25 percent or greater than 45 percent.

The most troubling aspect of our study was the failure to find any relationship between rent burdens and moves by renter households. The proportion of renters with severe rent burdens who move is essentially no different than the proportion of renters with normal rent burdens who move. Similarly movers chose units that result in a severe rent burden in the same proportion as non-movers experience severe rent burdens. If the rent burden ratio actually identifies household experiencing hardships, then we would expect different moving behavior from these households. The data do not show the expected differences.

On the good news side, despite some differences, the AHS appears to paint the same rent burden picture as the ACS, the CEX, and the SIPP. When we examined the components of rent burden—housing costs and household income—the AHS mirrored closely the information produced by the other three surveys.

When we compare households on the consistency of their rent burdens over three surveys, we find real differences between households that have severe rent burdens in all three surveys or two out of three surveys and other households with respect to variables such as income, age, and quality of unit. The rent burden ratio correlates well with other measures of household hardship. Susin reached similar conclusions about the characteristics of household with consistent severe rent burdens even though our results do not match for all characteristics.

Finally, the AHS variables that look for outside assistance for very low-income households with severe rent burdens indicate that approximately 20 percent of these households receive some form of outside assistance. In this respect and with respect to household and unit characteristics, the rent burden ratio has some of the properties that we would expect.

The resources allocated for this study were devoted mainly to comparing rent burdens as calculated by the AHS to rent burdens calculated using data from other surveys. Therefore, only limited attention was given to the issues of how the variability in the housing costs and household income affects the rent burden measure and whether rent burdens induce household responses that are consistent with the hardship supposedly measured by rent burden. The intuitive appeal of the rent burden measure and its consistent use over many years in measuring

housing needs suggests that more attention should be devoted to the resolving the questions raised by this study.

## Appendix A: Additional Tables

**Table A-1: Frequency Distributions of Rent Burdens: Comparing Four Federal Surveys**

	AHS (2007)	ACS (2007)	CEX (2007: full sample, imputed income)	SIPP (2005)
Total Rentals	35,044,000	36,862,873	NA <sup>29</sup>	36,976,894
Used in distribution	31,616,000	34,081,869	NA	25,783,130
<b>Rent Burden</b>				
Less than 5 percent	0.7%		0.8%	1.8%
5 to 9 percent	3.0%		4.4%	3.4%
Less than 10 percent	3.7%	4.0%	5.2%	5.3%
10 to 14 percent	7.0%	9.1%	10.1%	8.4%
15 to 19 percent	10.2%	12.8%	14.2%	13.1%
20 to 24 percent	11.0%	13.1%	13.4%	13.1%
25 to 29 percent	11.8%	11.7%	10.7%	11.0%
30 to 34 percent	9.8%	9.1%	9.2%	9.5%
35 to 39 percent	7.8%	6.6%	6.0%	7.6%
40 to 49 percent	10.3%	9.1%	8.4%	10.3%
50 percent or more	28.6%	24.6%	22.8%	21.8%
50 to 59 percent	6.2%		5.2%	5.4%
60 to 69 percent	4.4%		3.4%	3.8%
70 to 99 percent	6.4%		5.9%	5.6%
100 percent or more	11.6%		8.2%	7.0%
Total	100.0%	100.0%	100.0%	100.0%
Zero or negative income	1,067,000		NA	809,593
No cash rent	2,361,000		NA <sup>30</sup>	3,141,852
Median (minus zero or negative income and no cash rents)	33	29.7	29	29.6
Median (minus zero or negative income and no cash rents and ratios $\geq 1$ )	30		27	28.0

<sup>29</sup> The data were weighted using CEX weights, but the counts are not reported for the CEX because CEX weights are not designed to add up to national totals with multiple quarters of data. This report uses multiple quarters of data to take advantage of the larger sample size in the full CEX sample.

<sup>30</sup> Estimated as approximately 3 percent of all renters.

**Table A-2: Frequency Distribution of Renter Income: Comparing Four Surveys**

<b>Renter occupied:</b>	<b>2007 AHS</b>	<b>2007 ACS</b>	<b>2007 CEX</b>	<b>2005 SIPP</b>
Based on	35,045,000	36,862,873	NA <sup>31</sup>	26,592,723
Less than \$5,000	8.8%	6.0%	6.0%	6.3%
\$5,000 to \$9,999	8.4%	8.8%	9.0%	6.1%
\$10,000 to \$14,999	9.0%	9.7%	10.0%	8.1%
\$15,000 to \$19,999	7.4%	8.6%	9.3%	9.6%
\$20,000 to \$24,999	7.8%	8.2%	8.0%	9.9%
\$25,000 to \$34,999	18.1%	14.3%	16.2%	16.1%
\$35,000 to \$49,999	14.9%	16.1%	17.0%	17.5%
\$50,000 to \$74,999		15.3%	14.8%	15.0%
\$75,000 to \$99,999		6.6%	5.5%	6.4%
\$50,000 to \$59,999	7.0%		7.4%	7.8%
\$60,000 to \$79,999	9.3%		8.8%	8.9%
\$80,000 to \$99,999	4.1%		4.1%	4.7%
\$100,000 to \$149,999		4.4%	2.8%	3.7%
\$150,000 or more		2.1%	1.3%	1.4%
\$100,000 to \$119,999	2.3%		1.6%	2.3%
\$120,000 or more	3.0%		2.5%	2.8%
Total	100.0%	100.0%	100.0%	100.0%
Median	\$28,921	\$30,915	\$28,800	\$31,008

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<sup>31</sup> The data were weighted using CEX weights, but the counts are not reported for the CEX because CEX weights are not designed to add up to national totals with multiple quarters of data. This report uses multiple quarters of data to take advantage of the larger sample size in the full CEX sample.



**Table A-3: Total Rental Housing Cost Distributions: Comparison of Four Surveys**

	2007 AHS	2007 ACS	2007 CEX	2005 SIPP
Total	35,045,000	36,862,873	NA <sup>32</sup>	36,976,894
Distribution based on	32,684,000	34,674,969	NA	26,592,723
Less than \$100	0.9%	0.4%	0.8%	1.1%
\$100 to \$199	2.7%	2.3%	3.2%	1.1%
\$200 to \$249	2.5%	1.9%	2.9%	0.9%
\$250 to \$299	2.1%	1.7%	3.0%	1.0%
\$300 to \$349	2.2%	1.9%	3.6%	1.9%
\$350 to \$399	2.5%	2.4%	3.9%	2.1%
\$400 to \$449	3.6%	3.4%	4.0%	3.5%
\$450 to \$499	4.6%	4.1%	4.6%	3.8%
\$500 to \$599	10.5%	10.2%	11.4%	10.0%
\$600 to \$699	12.2%	11.6%	12.3%	11.2%
\$700 to \$799	11.4%	11.3%	10.5%	12.4%
\$800 to \$999	18.1%	18.5%	16.5%	20.3%
\$1,000 to \$1,249	12.5%	13.5%	11.1%	15.1%
\$1,250 to \$1,499	6.4%	7.2%	4.8%	6.9%
\$1,500 to \$1,999	5.0%	6.2%	4.4%	5.7%
\$2,000 or more	2.9%	3.3%	3.0%	3.0%
Total	100.0%	100.0%	100.0%	100.0%
Median	\$ 755	\$ 789	\$ 718	\$ 799
No cash rent (percent of Total)	6.7%	5.9%	3.1%	11.8%

<sup>32</sup> The data were weighted using CEX weights, but the counts are not reported for the CEX because CEX weights are not designed to add up to national totals with multiple quarters of data. This report uses multiple quarters of data to take advantage of the larger sample size in the full CEX sample.

## **Appendix B: Derivation of Consumer Expenditure Survey (CEX) Estimates**

### **A. The Consumer Expenditure Survey**

On behalf of the Bureau of Labor Statistics (BLS), the Census Bureau collects information on a continuous basis for the Consumer Expenditure Survey (CEX). BLS uses CEX data for a number of purposes, the most important of which are updating the basket of goods used in the Consumer Price Index (CPI) and the weights assigned to the components of the CPI.

The CEX consists of two separate surveys: an Interview survey and a Diary survey. The Interview survey collects information on items that compose 95 percent of all expenditures; the Diary survey collects information on all expenditures during the diary period. The Interview survey is conducted once a quarter for 5 successive quarters. The first Interview survey gathers information on the consumer unit while all five surveys record expenditures during the preceding 3 months.<sup>33</sup> Information on income and assets is collected in the second and fifth surveys. The Diary survey uses diaries to record expenditures over a 2-week period; each consumer unit in the survey is given two diaries, one for the first week and one for the second week. The target sample for the Interview survey is 7,060 consumer units and the target sample for the Diary survey is 7,050 consumer units. The Interview sample is divided into three panels, one of which is interviewed in the first month of the quarter, one in the second month, and one in the third month.

A consumer unit is defined more broadly than a “family” but less broadly than a “household.”

A consumer unit consists of any of the following: (1) All members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who use their incomes to make joint expenditure decisions. Financial independence is determined by spending behavior with regard to the three major expense categories: Housing, food, and other living expenses. To be considered financially independent, the respondent must provide at least two of the three major expenditure categories, either entirely or in part.<sup>34</sup>

Students living in college- or university-regulated housing report their own expenditures directly, while at school, rather than being considered part of their parents’ household.<sup>35</sup>

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<sup>33</sup> BLS uses only the expenditure data from the last four surveys in its published estimates.

<sup>34</sup> FAQ on the CEX at <http://www.bls.gov/cex/faq.htm#q3>.

<sup>35</sup> 2007 CONSUMER EXPENDITURE INTERVIEW SURVEY, PUBLIC USE MICRODATA, User’s Documentation, February 9, 2009, page 151. The frequency with which students satisfy the financial independence tests and what happens if they do not pass these tests is not clear from the sources cited. We presume that failure to pass the financial independence test would result in students being dropped from the survey. The TENURE variable allows us to exclude student consumer units.

## B. CEX File Structure

The 2007 Interview public use file (PUF) release contains five groups of Interview data files (FMLY, MEMB, MTAB, ITAB, and ITAB\_IMPUTE), 51 EXPN files, and processing files. The FMLY file contains consumer unit characteristics, income, and summary level expenditures; the MEMB file contains member characteristics and income data; the MTAB file contains expenditures organized on a monthly basis at the universal classification code (UCC) level; the ITAB file contains income data converted to a monthly time frame and assigned to UCCs; and the ITAB\_IMPUTE file contains the five imputation variants of the income data converted to a monthly time frame and assigned to UCCs. Each of the 51 EXPN files contains five quarters of data derived from their respective questionnaire sections, while separate FMLY, MEMB, MTAB, ITAB, and ITAB\_IMPUTE files are available separately for each of the five quarters for which interviews were conducted. The universal classification codes identify separate expenditure categories and separate income categories. Examples are 290420 (infants' furniture), 290430 (patio, porch, or outdoor furniture), 900150 (food stamps), and 910040 (refunds from property taxes).

The FMLY file contains a variable RNTXRCQ, which is described as "rent excluding rent as pay last quarter" that aggregates expenditures on 16 UCCs. RNTXRCQ corresponds to what BLS terms "housing costs," a concept broader than the monthly housing costs in the AHS in that shelter costs includes maintenance expenditures by renters. For this reason, our work used the MTAB and ITAB files.

## C. Record Structure

Table B-1 contains information on income and contract rent collected from three consumer units (CUs) during the four quarters of 2007 and the first quarter of 2008.

Information on contract rent (UCC = 210110) comes from the MTAB files. Information on income before taxes (UCC = 980000) comes from the ITAB files. These files contain information *collected on a quarterly basis but reported on a monthly basis*. The SAS file names are MTBI<sub>xx</sub>y and ITBI<sub>xx</sub>y, where xx identify the year and y the quarter in which the data were collected.

For example, MTBI.071 will contain information collected in the first quarter of 2007. Three panels were interviewed during this quarter.

- One panel was interviewed in January about expenditures over the period of October through December 2006, and the answers are divided by three and reported for October, November, and December of 2006.
- A second panel was interviewed in February about expenditures over the period November 2006 through January 2007, and the answers are divided by three and reported for November and December of 2006 and January 2007.
- A third panel was interviewed in March about expenditures over the period December 2006 through February 2007, and the answers are divided by three and reported for December of 2006 and January and February 2007.

**Table B-1: Three Examples of CEX Cases**

File	NEWID	REFMO	REFYR	UCC	PUBFLAG	VALUE	VALUE_	From	NEWID	UCC	COST	COST_	GIFT	PUBFLAG	REF_MO	REF_YR
ITBI072	1828072	1	2007	980000	2	2666.7		MTBI072	1828072	210110	700.0	D	2	2	1	2007
ITBI072	1828072	2	2007	980000	2	2666.7		MTBI072	1828072	210110	700.0	D	2	2	2	2007
ITBI072	1828072	3	2007	980000	2	2666.7		MTBI072	1828072	210110	700.0	D	2	2	3	2007
ITBI073	1828073	4	2007	980000	2	2666.7		MTBI073	1828073	210110	700.0	D	2	2	4	2007
ITBI073	1828073	5	2007	980000	2	2666.7		MTBI073	1828073	210110	700.0	D	2	2	5	2007
ITBI073	1828073	6	2007	980000	2	2666.7		MTBI073	1828073	210110	700.0	D	2	2	6	2007
ITBI074	1828074	7	2007	980000	2	2666.7		MTBI074	1828074	210110	700.0	D	2	2	7	2007
ITBI074	1828074	8	2007	980000	2	2666.7		MTBI074	1828074	210110	700.0	D	2	2	8	2007
ITBI074	1828074	9	2007	980000	2	2666.7		MTBI074	1828074	210110	700.0	D	2	2	9	2007
ITBI081	1828075	10	2007	980000	2	3333.3		MTBI081	1828075	210110	706.7	D	2	2	10	2007
ITBI081	1828075	11	2007	980000	2	3333.3		MTBI081	1828075	210110	706.7	D	2	2	11	2007
ITBI081	1828075	12	2007	980000	2	3333.3		MTBI081	1828075	210110	706.7	D	2	2	12	2007
						34000.0			Rent burden	24.8%	8420.0					

Table B-1 (continued): Three Examples of CEX Cases

File	NEWID	REFMO	REFYR	UCC	PUBFLAG	VALUE	VALUE_	From	NEWID	UCC	COST	COST_	GIFT	PUBFLAG	REF_MO	REF_YR
ITBI073	1838842	5	2007	980000	2	2532.6		MTBI073	1838842	210110	545.0	D	2	2	5	2007
ITBI073	1838842	6	2007	980000	2	2532.6		MTBI073	1838842	210110	545.0	D	2	2	6	2007
ITBI073	1838842	7	2007	980000	2	2532.6		MTBI073	1838842	210110	545.0	D	2	2	7	2007
ITBI074	1838843	8	2007	980000	2	2561.0		MTBI074	1838843	210110	700.0	F	2	2	8	2007
ITBI074	1838843	9	2007	980000	2	2561.0		MTBI074	1838843	210110	700.0	F	2	2	9	2007
ITBI074	1838843	10	2007	980000	2	2561.0		MTBI074	1838843	210110	700.0	F	2	2	10	2007
ITBI081	1838844	11	2007	980000	2	2433.4		MTBI081	1838844	210110	516.7	F	2	2	11	2007
ITBI081	1838844	12	2007	980000	2	2433.4		MTBI081	1838844	210110	516.7	F	2	2	12	2007
ITBI081	1838844	1	2008	980000	2	2433.4		MTBI081	1838844	210110	516.7	F	2	2	1	2008
						20147.7			Rent burden	23.7%	4768.3					
File	NEWID	REFMO	REFYR	UCC	PUBFLAG	VALUE	VALUE_	From	NEWID	UCC	COST	COST_	GIFT	PUBFLAG	REF_MO	REF_YR
ITBI071	1771774	11	2006	980000	2	1083.3		MTBI071	1771774	210110	400.0	D	2	2	11	2006
ITBI071	1771774	12	2006	980000	2	1083.3		MTBI072	1771774	210110	400.0	D	2	2	12	2006
ITBI071	1771774	1	2007	980000	2	1083.3		MTBI072	1771774	210110	400.0	D	2	2	1	2007
ITBI072	1771775	2	2007	980000	2	1125.0		MTBI072	1771775	210110	650.0	D	2	2	2	2007
ITBI072	1771775	3	2007	980000	2	1125.0		MTBI072	1771775	210110	650.0	D	2	2	3	2007
ITBI072	1771775	4	2007	980000	2	1125.0		MTBI072	1771775	210110	650.0	D	2	2	4	2007
						4458.3			Rent burden	52.7%	2350.0					

Because panels are rotated into and out of the sample on a continuous basis, we will not have 12 months of data for all the consumer units. For example, panels entering after March 2007 will not have information on January 2007, and panels exiting before January 2008 will not have information on December 2007. There will be 12 months of data on each consumer unit but not necessarily 12 months of 2007.

There is a separate record for each UCC (uniform classification code) and each consumer unit and each month. The consumer units are identified by the variable NEWID, which consists of 7 digits. The first 6 digits identify the consumer unit, while the 7<sup>th</sup> digit identifies the number of the interview. The months are identified by REF\_MO (reference month) and REF\_YR (reference year). Table B-1 reports all the information contained in each record.<sup>36</sup>

The first consumer unit has NEWIDs where the first six digits are 182807. This CU was interviewed for the 2<sup>nd</sup> time in April 2007 and for the last time in January 2008—files with the suffixes of 072, 073, 074, and 081. Accordingly, the data reported for 182807 cover the 12 months of 2007. VALUE\_ and COST\_ are flag variables; a blank in VALUE\_ means “Not topcoded” and a D in COST\_ means “valid Data - the data field contains a valid value and is unadjusted.”

For Table 3, what we do with this CU is sum the 12 months of contract rents, add in 12 months of other housing costs (e.g., utilities or rental insurance), and then divide this sum by the sum of 12 months of before-tax income. In Table B-1, we calculate a rent burden *using just* contract rent. For 182807, this “rent burden” was 24.8 percent.

The second consumer unit has NEWID where the first six digits are 183884. This CU was interviewed for the 2<sup>nd</sup> time in August 2007 and for the 4<sup>th</sup> time in February 2008—files with the suffixes of 073, 074, and 081. Accordingly, the data reported for 183884 cover the 8 months of May to December 2007. Using just these 8 months and only contract rent, Table B-1 calculates a rent burden of 23.7 percent. Note that 5 of the 8 numbers we used for contract rent were flagged as F (Valid Data, imputed—the data field contains a valid data value that has been imputed or in some other way adjusted).

The third consumer unit has NEWID where the first six digits are 177177. This CU was interviewed for the 4<sup>th</sup> time in February 2007 and for the 5<sup>th</sup> (and last) time in May 2007—files with the suffixes of 071 and 072. Accordingly, the data reported for 177177 cover the 4 months of January through April 2007. Using just these 4 months and only contract rent, Table B-1 calculates a rent burden of 52.7 percent.

For Table 3, we computed rent burden for every consumer unit in the files with suffixes 071, 072, 073, 074, and 081 using only the data on these units for 2007. We used the income before taxes (UCC = 980000) from both the imputed income file ITAB\_IMPUTE and the sum of the nine housing costs listed in Table B-2:

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<sup>36</sup> PUBFLAG indicates whether the information in the record was used in the published reports; a code of 2 indicates the information was used.

**Table B-2: UCCs Used for Rental Housing Costs**

UCC #	UCC definition
210110	Rent of dwelling
250111	Fuel oil – renter
250211	Gas, bottled or tank – renter
250911	Other fuels – renter
260111	Electricity – renter
260211	Natural or utility gas – renter
270211	Water and sewerage maintenance – renter
270411	Trash and garbage collection – renter
350110	Renter’s insurance

We used the FMLY file to add two variables to these records: a tenure variable CUTENURE and a weight variable FINLWT21. These variables can vary by quarter.

The coding for CUTENURE is as follows:

- 1 Owned with mortgage
- 2 Owned without mortgage
- 3 Owned mortgage not reported
- 4 Rented
- 5 Occupied without payment of cash rent
- 6 Student housing

We selected cases where CUTENURE = 4 or 5. Because CUTENURE can vary, we calculated an average CUTENURE. If the average equaled 4, we used the CU in the distribution of rent burden. If the average equaled 5, we counted these units but kept them separate from the distribution. If the average was between 4 and 5, we discarded the CU. For the 2007 files, 95 percent of CUs had an average of 4, 3 percent had an average of 5, and 2 percent had an average between 4 and 5.

The MTAB files have a feature that requires some special handling. A quarterly file may contain two or more records with identical values for NEWID, UCC, REF\_MO, REF\_YR, and GIFT. Our interpretation is that the consumer unit may report for the quarter more than one expenditure that falls within the definition of a particular UCC. In general, we sum COST for all the records with the appropriate UCC as long as they are not gifts. The exception is contract rent, UCC = 210110.

Table B-3 lists, as examples, all the records in the five MTAB files with UCC = 210110 for two consumer units.

**Table B-3: Examples of Consumer Units with More Than One Record for Contract Rent**

NEWID	UCC	COST	COST_	GIFT	PUBFLAG	REF_MO	REF_YR	Sum by month
1782073	210110	\$202.00	D	2	2	1	2007	
1782073	210110	\$135.00	D	2	2	1	2007	\$337.00
1782073	210110	\$202.00	D	2	2	2	2007	
1782073	210110	\$135.00	D	2	2	2	2007	\$337.00
1782074	210110	\$167.33	D	2	2	3	2007	
1782074	210110	\$140.00	D	2	2	3	2007	\$307.33
1782074	210110	\$167.33	D	2	2	4	2007	
1782074	210110	\$140.00	D	2	2	4	2007	\$307.33
1782074	210110	\$167.33	D	2	2	5	2007	
1782074	210110	\$140.00	D	2	2	5	2007	\$307.33
1782075	210110	\$500.00	D	2	2	6	2007	
1782075	210110	\$140.00	D	2	2	6	2007	\$640.00
1782075	210110	\$500.00	D	2	2	7	2007	
1782075	210110	\$140.00	D	2	2	7	2007	\$640.00
1782075	210110	\$500.00	D	2	2	8	2007	
1782075	210110	\$140.00	D	2	2	8	2007	\$640.00
NEWID	UCC	COST	COST_	GIFT	PUBFLAG	REF_MO	REF_YR	Sum by month
1835832	210110	\$383.33	D	2	2	1	2007	
1835832	210110	\$200.00	D	2	2	1	2007	\$583.33
1835832	210110	\$383.33	D	2	2	2	2007	
1835832	210110	\$200.00	D	2	2	2	2007	\$583.33
1835832	210110	\$383.33	D	2	2	3	2007	
1835832	210110	\$200.00	D	2	2	3	2007	\$583.33
1835833	210110	\$575.00	D	2	2	4	2007	\$575.00
1835833	210110	\$575.00	D	2	2	5	2007	\$575.00
1835833	210110	\$575.00	D	2	2	6	2007	\$575.00
1835834	210110	\$575.00	D	2	2	7	2007	\$575.00
1835834	210110	\$575.00	D	2	2	8	2007	\$575.00
1835834	210110	\$575.00	D	2	2	9	2007	\$575.00
1835835	210110	\$575.00	D	2	2	10	2007	\$575.00
1835835	210110	\$575.00	D	2	2	11	2007	\$575.00
1835835	210110	\$575.00	D	2	2	12	2007	\$575.00

For consumer unit 178207, there are two UCC = 210110 records for all 8 months. The sums of the records within each month are not consistent across the 8 months. For consumer unit 183583, there are two UCC = 210110 for months 1 through 3 and then only one record for months 4 through 12. The monthly totals are consistent across the 12 months.

We examined the records for five consumer units with multiple records for contract rent and found consistency in only two of the five cases. For this reason, we eliminated cases where there were multiple UCC = 210110 records. We did this by counting the number of records by consumer unit where UCC = 210110 and the number where UCC = 980000. If the case was a “rent for cash” case, we required the two counts to be equal.



The count of records where UCC = 980000 was used as a count of months. We calculated monthly income by dividing the sum of all records for monthly income by the count of months. Similarly, we calculated monthly gross rent by dividing the sum of all rental costs by the count of months.

The weight (FINWT21) varies across quarters more than we would have expected. Table B-4 contains the FINWT21 for the three CUs used as examples in Table B-1 and the relevant quarters.

**Table B-4: Final Weights for Three Example Cases**

CU	File	FINLW21	Average
177177	FAMLI071	11721.876	
	FAMLI072	13466.454	12594.165
182807	FAMLI072	18914.355	
	FAMLI073	11945.677	
	FAMLI074	14031.202	
	FAMLI081	11219.471	14027.676
183884	FAMLI073	12977.466	
	FAMLI074	12297.457	
	FAMLI081	10585.208	11953.377

We used the average final weight in compiling Table 2.

## ***Appendix C: Derivation of Survey of Income and Program Participation (SIPP) Estimates***

### **A. Survey of Income and Program Participation (SIPP)**

Since 1984, the Census Bureau has carried out a survey designed to find out the extent to which households participate in federal programs intended to assist low income families, such as Food Stamps, welfare, and assisted housing. SIPP was redesigned in 1996. Under the current design, a sample is drawn and interviewed every 4 months for a set period of time. The sample of households is called a panel and each interview is called a wave. The panel is split into four rotations, with each rotation interviewed consistently in the first, second, third, or fourth month of a 4-month wave. If a household moves, SIPP follows the household to the new unit. If members split off from a household, SIPP continues to follow the original household and any new household formed by the member or members who left the original household. Each interview contains a set of core questions that focus on the key interests of the SIPP survey: income, participation in government transfer programs, employment, and health insurance coverage. Some waves also contain topical modules that ask about other issues. The 2008 SIPP panel began in September 2008 and will run through December 2013.

We use the sixth wave of the 2004 panel because this wave contains the most recently released data related to housing costs. The 2004 panel consisted of approximately 37,000 households; the sixth wave of the 2004 panel was collected between October 2005 and January 2006. The wave 6 topical modules included data on: medical expenses, poverty, work-related expenses and child support paid, assets and liabilities, real estate, shelter costs, dependent care, vehicles, value of business, interest earning accounts, rental property, stocks and mutual fund shares, mortgages, other financial investments, annual income, retirement accounts, and taxes.

The Census Bureau provides extensive documentation on SIPP and on the SIPP public use files (PUFs). Unfortunately, some of the information on the Web site is out of data. PUF users should make use of the updated Users Guide found on a chapter-by-chapter basis at <http://www.census.gov/sipp/usrguide.html> and not the 2001 version available in complete form in PDF© format.

### **B. Analysis of the Wave 6 Data**

We used both the core data file and the topical data file from wave 6. Two variables are needed to match records across these files: SSUID (Sample unit identifier) and SHHADID (Household address ID, which identifies the original household and households spawned from an original sample household).

From the core file, we selected records with the following characteristics: the record corresponds to the householder (ERRP = 1 or 2), the household lives in a unit rented for cash (ETENURE = 2), the rental unit is not subsidized (EPUBHSE NE 1 AND EGVTRNT NE 1), and the interview was successful (EOUTCOME = 201). From the core file, we obtained total household income

(THTOTINC) and the household weight (WHFNWGT). We selected records by rotation (SROTATION) and interview month (RHCALMN).

From the topical file, we selected all the records that were successful interviews (EOUTCOME = 201) of the householder (ERRP = 1 or 2). From the topical file, we obtained monthly mortgage or rent (THOMEAMT) and monthly utilities (TUTILS).

Merging the two files resulted in a file of households in unassisted units who paid cash rent. For these households, we had estimates of income, rent, and utilities.

It should be noted that the information on utility costs is gathered in a single question (RE30) that reads as follows:

How much did this household pay for electricity, gas, basic telephone service, and other utilities last month? IF RESPONDENT REPORTS "0", NOTHING, OR INCLUDED IN RENT ENTER (N) FOR NONE

## **Appendix D: Simulating the Effects of Variability in Measuring Housing Costs and Income**

We assume that  $Y = y + a$  where  $Y$  is measured income,  $y$  is actual income, and  $a$  is measurement error or random fluctuations around “permanent income”.

We assume that  $R = r + b$  where  $R$  is measured gross rent,  $r$  is actual gross rent, and  $b$  is measurement error or random fluctuations in gross rent.

Rent burden is measured as  $C = Y/R$  or  $C = (r + b)/(y + a)$ .

If  $Y$  and  $R$  are normally distributed *and independent*, then  $C$  has a Cauchy distribution.<sup>37</sup> But, in this case,  $Y$  and  $R$  are correlated and the distribution of  $C$  is more complicated. For this reason, we used simulations to estimate the impact of measurement errors.

For the simulation, we made the following assumptions:

$a$  is normally distributed with zero mean and a standard deviation proportional to income.  
 $a \sim N(0, \alpha y)$

$b$  is normally distributed with zero mean and a standard deviation proportional to gross rent.  $b \sim N(0, \beta r)$

$N(0, \alpha y)$  has the same distribution as  $yN(0, \alpha)$  and  $N(0, \beta r)$  has the same distribution as  $rN(0, \beta)$ .

Let  $c = r/y$ , the actual rent burden.

$$C = (r + b)/(y + a) = (r/y + b/y)/(1 + a/y) = (r/y + (r/y)(b/r))/(1 + a/y) = c(1+b/r)/(1+a/y)$$

Any particular draw from the distribution  $N(0, \alpha y)$  can be expressed as  $a = my$ , and any particular draw from the distribution  $N(0, \beta r)$  can be expressed as  $b = nr$ , where  $m$  and  $n$  are the equivalent draws from  $N(0, \alpha)$  and  $N(0, \beta)$ . So for a set of draws:

$$C = c(1+m)/(1+n)$$

For the simulation, we assumed  $\alpha = 0.25$  and  $\beta = 0.125$ . We made a 1000 draws of  $(m, n)$  and calculated  $(1+m)/(1+n)$  for each draw.

We applied these 1,000 fractions to three subpopulations, one with 4,000 households where  $c = 0.25$ , one with 2,000 households where  $c = 0.35$ , and one with 4,000 households where  $c = 0.45$ .

This process could have been repeated multiple times to obtain a more precise estimate of the effects of measurement errors under these particular assumptions. We could also vary the

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<sup>37</sup> Wikipedia, Ratio Distribution.

assumptions. However, the thrust of this analysis is not to estimate the impact precisely, but simply to demonstrate that measurement errors could explain a meaningful share of the percentage of households with severe burdens.