Data Shop

Data Shop, a department of Cityscape, *presents short articles or notes on the uses of data in housing and urban research. Through this department, the Office of Policy Development and Research introduces readers to new and overlooked data sources and to improved techniques in using well-known data. The emphasis is on sources and methods that analysts can use in their own work. Researchers often run into knotty data problems involving data interpretation or manipulation that must be solved before a project can proceed, but they seldom get to focus in detail on the solutions to such problems. If you have an idea for an applied, data-centric note of no more than 3,000 words, please send a one-paragraph abstract to david.a.vandenbroucke@hud.gov for consideration.*

Measuring Housing Affordability

Paul Joice
U.S. Department of Housing and Urban Development

The views expressed in this article are those of the author and do not represent the official positions or policies of the Office of Policy Development and Research, the U.S. Department of Housing and Urban Development, or the U.S. government.

Abstract

This article discusses how the U.S. Department of Housing and Urban Development (HUD) measures housing affordability and presents an analysis of custom tabulations of the 2006–2010 American Community Survey (ACS), known as the "Comprehensive Housing Affordability Strategy (CHAS) data." The CHAS data combine ACS microdata with HUD-adjusted Median Family Incomes to create estimates of the number of households that would qualify for HUD assistance. Using these data, the author estimates the number of rental units and ownership units that would be affordable to prototypical households at specified income levels.

Introduction

In 1990, Congress passed the National Affordable Housing Act, which required that state and local governments participating in selected U.S. Department of Housing and Urban Development (HUD) grant programs prepare a Comprehensive Housing Affordability Strategy (CHAS). The CHAS was intended to serve as the strategic guide for housing and community development activities for low- and moderate-income households (Hoben and Richardson, 1992). To support this analysis, HUD and the U.S. Census Bureau produced custom tabulations of census data that provided grantees with information about the housing needs of low- and moderate-income households. As a planning document, the CHAS was superseded in 1995 by the Consolidated Plan, but the custom tabulations of census data continue to be known as the "CHAS data." The CHAS data were updated after the 2000 census and, in 2009, they were updated to rely on the American Community Survey (ACS), the Census Bureau's new annual survey that replaced the long form of the decennial census.[1]

The CHAS data combine ACS microdata with HUD-adjusted Median Family Incomes (HAMFIs) to create estimates of the number of households that would qualify for HUD assistance. The CHAS data also incorporate household characteristics (such as race and ethnicity, age, and family size) and housing unit characteristics (such as number of bedrooms and rent or owner costs). These characteristics are combined into a series of cross-tabulations, each of which has a particular focus. This article presents an analysis of one particular component of the 2006–2010 CHAS data: a series of tables that estimate the affordability of the housing stock and the extent to which affordable units are available to lower income households.

The remainder of this article explains how HUD calculates the income and affordability variables used in the CHAS, then presents resulting estimates of the stock of affordable housing during the 2006-through-2010 period.

Household Income

The essential characteristic of the CHAS data is the combination of ACS microdata and HAMFIs. The HAMFI estimates used in the CHAS are slightly different from the official income limits produced by HUD to govern program eligibility. Official income limits are adjusted so that the 80-percent income limit cannot exceed the U.S. median; the estimates are then adjusted further to reflect high housing costs in certain jurisdictions. The HAMFIs used for the CHAS data undergo these same adjustments. The main difference is that the official income limits are also trended forward to the fiscal year in which they are effective. The 2006–2010 ACS microdata are used to produce fiscal year (FY) 2013 income limits, so income data must be trended forward from 2010 to the middle of FY 2013. These adjustments are not necessary for the production of the CHAS data.

Like the official income limits, HAMFIs are computed for counties, county equivalents (also referred to as minor civil divisions, or MCDs), and Fair Market Rent, or FMR, areas, such that every area

[1] The Census Bureau uses the ACS to produce three different sets of estimates: 1-year estimates, 3-year estimates, and 5-year estimates. The CHAS relies primarily on 5-year estimates, because they have the largest sample size and allow for the analysis of smaller geographies.

in the country has one—and only one—relevant HAMFI. Each household in the ACS microdata is matched with the appropriate HAMFI and classified based on how its income compares with specific HAMFI thresholds. The most relevant thresholds are 50 and 80 percent of HAMFI, because most HUD programs base eligibility on these thresholds (which are generally referred to as "very low income" and "low income," respectively).[2] HAMFI thresholds are calibrated for a four-person household and are adjusted up (by 8 percent for each person above four) or down (by 10 percent for each person below four) based on the number of people in each household. For example, in Lexington-Fayette County, Kentucky, 80 percent of HAMFI for a four-person household is $48,000. For a three-person household, 80 percent of HAMFI is $43,200 ($48,000 * 0.9), so a three-person household with household income of $43,000 would be below the 80-percent-of-HAMFI threshold and would be considered low income. Exhibit 1 presents nationwide totals for the number of households in various categories.

Other analyses of the number of households in HUD-specified income categories tend to focus specifically on renters. Collinson (2011) used ACS public use microsamples to estimate that the number of very low-income renter households in 2007 was 16.17 million, and that the number rose to 17.84 million in 2009. According to HUD's *Worst Case Housing Needs: A Report to Congress,* which relies on American Housing Survey (AHS) data (Hardiman et al., 2010; Steffen et al., 2011), the number of very low-income renter households was 15.94 million in 2007 and 17.12 million in 2009. The 2006–2010 CHAS data indicate an average of 16.58 million very low-income renter households during the 2006-through-2010 period; this estimate is consistent with other analyses.

Exhibit 1

Household Income As a Percentage of HAMFI, Nationwide, 2006–2010 CHAS Data

Income Category	Number of Households	Percent of Total Households
Extremely low income (≤ 30% of HAMFI)	14,579,845	12.63
Very low income (≤ 50% of HAMFI)	28,049,660	24.29
Low income (≤ 80% of HAMFI)	47,029,470	40.73
Low and middle income (≤ 100% of HAMFI)	58,909,235	51.02
Upper income (> 100% of HAMFI)	56,533,795	48.98
Total	**115,463,030**	**100.00**

CHAS = Comprehensive Housing Affordability Strategy. HAMFI = U.S. Department of Housing and Urban Development-adjusted Median Family Income.

Affordability

Housing practitioners generally agree that housing is "affordable" if the tenants pay no more than 30 percent of their household income toward housing costs. Many of the CHAS tables use this standard approach to affordability and provide estimates of the number of households with cost burden (paying more than 30 percent of income for housing) or severe cost burden (paying more than 50 percent of income for housing). Exhibit 2 presents CHAS estimates of the incidence of cost

[2] "Very low income" and "low income" are the terms used by HUD's public housing and voucher program. Programs run through the Office of Community Planning and Development call the 50-percent income limit "low income" and the 80-percent income limit "moderate income." This article uses the terminology of the public housing and voucher programs.

Exhibit 2

Frequency of Cost Burden and Severe Cost Burden, by Income Category

Income Category	Number (and Percent) of Households That Are Cost Burdened	Number (and Percent) of Households That Are Severely Cost Burdened	Total
Extremely low income (household income ≤ 30% of HAMFI)	11,056,680 (76%)	9,070,700 (62%)	14,579,845
Very low income (30% of HAMFI < household income ≤ 50% of HAMFI)	9,161,440 (68%)	4,397,660 (33%)	13,469,815
Low income (50% of HAMFI < household income ≤ 80% of HAMFI)	8,585,190 (45%)	2,526,650 (19%)	18,979,810
Middle income (80% of HAMFI < household income ≤ 100% of HAMFI)	3,592,615 (30%)	780,525 (7%)	11,879,765
Upper income (100% of HAMFI < household income)	7,037,465 (12%)	978925 (2%)	56,553,795
Total	39,366,890 (34%)	17,754,460 (15%)	115,463,030

HAMFI = U.S. Department of Housing and Urban Development-adjusted Median Family Income.

burden and severe cost burden for households in different income categories. Among extremely low-income households, 76 percent pay more than 30 percent of their income for housing and 62 percent pay more than 50 percent of their income for housing. Cost burden is common even for households with incomes in the 80- to 100-percent range, but severe cost burden becomes much less common for middle-income and upper income households.

Cost burden is an important, simple, and intuitive measure of housing affordability. The CHAS data provide an alternative measure that is also worth considering. This alternate measure does not define affordability from the perspective of the current occupant of a home but considers whether a particular housing unit would be affordable to a generic household with an income at the HAMFI thresholds of interest.

To further clarify this concept of affordability, consider a hypothetical two-bedroom unit that is vacant and for rent in Lexington-Fayette County, Kentucky. The rental unit has an asking price (contract rent) of $1,000 and utility costs were estimated by the landlord (or imputed by the Census Bureau) to be $200, making the gross rent $1,200 per month. Is the unit affordable to a household with an income at 80 percent of HAMFI, assuming a 30-percent payment standard for affordability? In Lexington, the threshold for 80 percent of HAMFI is $48,000 for a four-person household; however, a two-bedroom unit might be considered overcrowded if occupied by four people.[3] To prevent a misalignment between household size and unit size, it is necessary to adjust the income of the generic household based on the number of bedrooms. This analysis assumes that a two-bedroom unit would be suitable for three people. As described previously, HUD adjusts HAMFIs for household

[3] HUD's Housing Quality Standards allow as many as two people per bedroom, but under the Low-Income Housing Tax Credit (LIHTC), rents are based on an assumption of one and one-half persons per bedroom (Section 42(g)(2)(c), Internal Revenue Code). This analysis uses the LIHTC standard because it seems more appropriate for a mix of family and nonfamily households and households at a variety of income levels.

size by subtracting 10 percent for each person fewer than four and adding 8 percent for each person more than four. For a three-person household, the four-person HAMFI is multiplied by 90 percent, so the household income that should be used for this analysis is $43,200 (0.9 * $48,000), which could be understood as the annual income for a generic three-person household with an income at 80 percent of HAMFI. For this household, the vacant two-bedroom unit in question is not affordable—the rent of $1,200 is 33 percent of the $3,600 monthly income of an appropriately sized household. Exhibit 3 presents the full spectrum of household size adjustments used to match units with household-size-adjusted incomes.

This analysis must confront one further complication. For renter-occupied and vacant-for-rent units, the rent currently being charged should be close to the rent that would be charged if a new household were to move into the unit. For owner-occupied units, however, the monthly owner costs paid by the current resident may be far different from a household seeking to purchase the same unit. Consider a household that purchased a home in 2000 for $100,000, using a 30-year fixed-rate mortgage with a 20-percent downpayment and a 5-percent interest rate. That household would have a monthly payment of approximately $430. If another household purchased the same home in 2013 for $150,000 with the same mortgage terms, they would have a monthly payment of approximately $650. Clearly, a home might be affordable to its current occupant but not to another household with the same income attempting to purchase it today. Home values are not the only factor that changes over time. According to Freddie Mac, in April 2013, the prevailing rate for new fixed-rate mortgages was approximately 3.5 percent. In 2001, the equivalent rate hovered around 7 percent. If interest rates decline significantly, the current occupant will not experience a decreased cost burden (unless they refinance), but new buyers will find higher levels of affordability. Estimates of cost burden that focus on the rents and mortgage payments currently experienced by households may underreport or overreport the extent of affordability when the housing market undergoes significant changes in a short period of time. This analysis seeks to estimate the affordability of the housing stock independent of current occupants. As a result, affordability of owner-occupied units is based on current values and current mortgage market conditions. This analysis requires some assumptions; while a 30-percent payment standard (housing costs to income ratio) is widely used for rental housing affordability, there is not such a clear consensus of the appropriate ratio of home price to income. According to Zillow, a company that estimates home values and analyzes real estate trends, the ratio of home price to income hovered around 2.6 throughout most of the 1980s and 1990s. This ratio peaked at 4 in 2006 and has since dropped back to around 3.

Exhibit 3

Household Size Adjustment Factors for Estimating Affordability

Number of Bedrooms	Household Income Adjustment Factor
0	0.70
1	0.75
2	0.90
3	1.04
4	1.16
5 or more	1.04 + (0.12 * [number of bedrooms – 3])

The owner affordability estimates in the CHAS data use a ratio of 3.36—that is, a household could afford to purchase a home if the home's value is less than or equal to 3.36 times the household's income.[4]

Affordability Results

Based on the standards described in the previous section, exhibits 4 and 5 present estimates of the affordability of the housing stock from 2006 through 2010. Information is presented for the United States (the 50 states, plus Washington, D.C., and Puerto Rico) and three specific jurisdictions: Washington, D.C. (a large city with high housing prices); Lexington-Fayette County, Kentucky (a moderate-size urban county with moderate housing prices); and Harris County, Texas (a large urban county with moderate housing prices).

Exhibit 4

Rental Affordability Estimates for Selected Jurisdictions, 2006–2010 CHAS Data

Rental Housing Units	Number (and Percent) of Housing Units in the United States	Number (and Percent) of Housing Units in Washington, D.C.	Number (and Percent) of Housing Units in Lexington-Fayette County, Kentucky	Number (and Percent) of Housing Units in Harris County, Texas
Rental units affordable at 50% of HAMFI	15,387,330 (36.8%)	76,110 (48.9%)	25,720 (45.6%)	199,710 (29.9%)
Rental units affordable at 80% of HAMFI	33,224,725 (79.5%)	100,055 (64.3%)	50,755 (89.9%)	536,810 (80.4%)
Total renter-occupied or vacant-for-rent units	41,797,205	155,670	56,445	667,890

CHAS = Comprehensive Housing Affordability Strategy. HAMFI = U.S. Department of Housing and Urban Development-adjusted Median Family Income.

Exhibit 5

Owner Affordability Estimates for Selected Jurisdictions, 2006–2010 CHAS Data

Owner Housing Units	Number (and Percent) of Housing Units in the United States	Number (and Percent) of Housing Units in Washington, D.C.	Number (and Percent) of Housing Units in Lexington-Fayette County, Kentucky	Number (and Percent) of Housing Units in Harris County, Texas
Owner units affordable at 50% of HAMFI	17,201,375 (21.8%)	6,050 (5.2%)	10,760 (15.3%)	263,725 (32.4%)
Owner units affordable at 80% of HAMFI	34,686,410 (44.0%)	9,300 (8.0%)	50,755 (89.9%)	536,810 (80.4%)
Total owner-occupied or vacant-for-sale units	78,887,365	115,650	70,290	814,370

CHAS = Comprehensive Housing Affordability Strategy. HAMFI = U.S. Department of Housing and Urban Development-adjusted Median Family Income.

[4] This factor is based on terms similar to those that might have been available for mortgages insured through the Federal Housing Administration, or FHA, during the 2006-through-2010 period: a 31-percent monthly payment standard, 96.5-percent loan-to-value ratio, 5.5-percent interest rate, 1.75-percent upfront insurance premium, 0.55-percent annual insurance premium, and 0.2-percent annual taxes and hazard insurance.

Nationwide, in the 2006-through-2010 period, a total of 41.8 million housing units were renter-occupied or vacant-for-rent units. Of these housing units, 36.8 percent were affordable to a household making 50 percent of HAMFI and 79.5 percent were affordable to a household making 80 percent of HAMFI. Collinson (2011) analyzed public use microsamples from the ACS (2007 and 2009) and AHS (2007 and 2009) and found similar levels of affordability for rental units.

In Washington, D.C., the 76,110 rental units that would be affordable to households making 50 percent of HAMFI constitute nearly one-half of the rental stock. Lexington-Fayette County is slightly less affordable to a very low-income household; 45.5 percent of its rental units would be affordable to a household making 50 percent of HAMFI. Bringing up the rear is Harris County at 29.9 percent, which is surprising, given that Harris County (at the center of the Houston metropolitan area) is generally thought to be a housing market with ample supply and relatively low prices. A different picture emerges when one looks at the low-income threshold (80 percent of HAMFI). Lexington-Fayette and Harris Counties both are slightly more affordable than the nation as a whole—89.9 and 80.4 percent, respectively, of their rental units would be affordable to a household making 80 percent of HAMFI. In Washington, D.C., however, only 64.3 percent of rental units are affordable to a household making 80 percent of HAMFI.

Exhibit 5 presents affordability of the stock of owner-occupied and vacant-for-sale housing. These results are more consistent with conventional wisdom about the housing markets in the three selected jurisdictions. Nationwide, 21.8 percent of owner units were affordable to households making 50 percent of HAMFI and 44 percent were affordable to households making 80 percent of HAMFI. In Washington, D.C., the corresponding figures are a paltry 5.2 and 8.0 percent, respectively. Lexington-Fayette County is relatively affordable to low-income households (56.4 percent of units), but it is less affordable to very low-income households (15.3 percent of units). In Harris County, 32.4 percent of owner units are affordable to very low-income households and a remarkable 71.7 percent of owner units are affordable to low-income households.

The preceding paragraphs discuss the affordability of the housing stock. It is also informative to analyze the extent to which affordable units are matched to the households that need them most. Exhibits 6 and 7 present estimates of the number of units that are both *affordable and available* to low- and very low-income households, with "available" defined as vacant or occupied by a household with income less than or equal to the income threshold in question.

As expected, the number of units that are both affordable and available is consistently lower than the number of affordable units. Nationwide, 5.6 million rental units would be affordable to very low-income households yet are occupied by households with higher incomes. Similarly, 9.5 million rental units would be affordable to low-income households but are occupied by higher income households. As a result, the percentage of rental units affordable and available to very low-income and low-income households is 23.3 and 56.8 percent, respectively.

When analyzing owner-occupied and vacant-for-sale units, one observes a more significant difference between "affordable" and "affordable and available." Of the 17.2 million owner housing units nationwide that are affordable to very low-income households, 71.0 percent of the units are occupied by households with incomes that are greater than 50 percent of HAMFI. Of the 34.7 million owner housing units nationwide that are affordable to low-income households, 59.0 percent of the units

Exhibit 6

Affordable and Available Rental Units, Selected Jurisdictions, 2006–2010 CHAS Data

Rental Housing Units	Number (and Percent) of Housing Units in the United States	Number (and Percent) of Housing Units in Washington, D.C.	Number (and Percent) of Housing Units in Lexington-Fayette County, Kentucky	Number (and Percent) of Housing Units in Harris County, Texas
Rental units affordable and available at 50% of HAMFI	9,738,650 (23.3%)	54,245 (34.8%)	15,920 (28.2%)	140,165 (21.0%)
Rental units affordable and available at 80% of HAMFI	23,741,185 (56.8%)	75,880 (48.7%)	36,225 (64.2%)	392,265 (58.7%)
Total renter-occupied or vacant-for-rent units	41,797,205	155,670	56,445	667,890

CHAS = Comprehensive Housing Affordability Strategy. HAMFI = U.S. Department of Housing and Urban Development-adjusted Median Family Income.

Exhibit 7

Affordable and Available Owner Units, Selected Jurisdictions, 2006–2010 CHAS Data

Owner Housing Units	Number (and Percent) of Housing Units in the United States	Number (and Percent) of Housing Units in Washington, D.C.	Number (and Percent) of Housing Units in Lexington-Fayette County, Kentucky	Number (and Percent) of Housing Units in Harris County, Texas
Owner units affordable and available at 50% of HAMFI	5,011,975 (6.4%)	2,825 (2.5%)	2,985 (4.2%)	73,435 (9.0%)
Owner units affordable and available at 80% of HAMFI	14,261,460 (18.1%)	5,175 (4.5%)	13,075 (18.6%)	209,415 (25.7%)
Total owner-occupied or vacant-for-sale units	78,887,365	115,650	70,290	814,370

CHAS = Comprehensive Housing Affordability Strategy. HAMFI = U.S. Department of Housing and Urban Development-adjusted Median Family Income.

are occupied by households with incomes that are greater than 80 percent of HAMFI. Only 6.4 and 18.1 percent of owner units are affordable and available to households at 50 and 80 percent of HAMFI, respectively. There are a number of possible explanations for the fact that so few owner units are affordable and available to low-income households. Foremost among them is that, in the 2006-through-2010 period, owner occupants had been living in their current units much longer than renter occupants; 55 percent of owners moved into their units before 2000 compared with only 16 percent for renters. These data indicate significantly less turnover of the owner-occupied housing stock. If household incomes and home values change significantly but households do not "re-sort" (move) to units that better fit their income level, affordability mismatches will result.

Conclusion

This article describes the process by which HUD and the Census Bureau produce the CHAS data and provides a sample analysis of rental and owner affordability. These data and the rest of the CHAS data are available on the website of HUD's Office of Policy Development and Research

(http://www.huduser.org/portal/datasets/cp.html). The data can be downloaded as text files or accessed by a new interactive query tool that produces tables for selected indicators. HUD has also created extracts of the CHAS data tailored to support the Consolidated Planning process; these data extracts have been loaded into HUD's enterprise Geospatial Information System, or eGIS, and support several recently developed analytic tools, including CPD Maps (http://egis.hud.gov/cpdmaps/) and the eCon Planning Suite. Local jurisdictions can use these resources to analyze the affordability of their housing market and to identify potential policy solutions.

Acknowledgments

The author thanks Todd Richardson, Marie Lihn, and Rob Collinson at the U.S. Department of Housing and Urban Development and thanks Dave Raglin and many others at the U.S. Census Bureau for their support in the development of the Comprehensive Housing Affordability Strategy data and their guidance on the analysis presented in this article.

Author

Paul Joice is a social science analyst at the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Program Evaluation Division.

References

Collinson, Rob. 2011. "Rental Housing Affordability Dynamics, 1990–2009," *Cityscape* 13 (2): 71–103.

Hardiman, David, Carolyn Lynch, Marge Martin, Barry Steffen, Dav Vandenbroucke, and Yung-Gann David Yao. 2010. *Worst Case Housing Needs 2007: A Report to Congress*. Washington, DC: U.S. Department of Housing and Urban Development.

Hoben, James, and Todd Richardson. 1992. *The Local CHAS: A Preliminary Assessment of First Year Submissions*. Washington, DC: U.S. Department of Housing and Urban Development.

Steffen, Barry, Keith Fudge, Marge Martin, Teresa Souza, Dav Vandenbroucke, and Yung-Gann David Yao. 2011. *Worst Case Housing Needs 2009: A Report to Congress*. Washington, DC: U.S. Department of Housing and Urban Development.