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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.

The Long-Term Dynamics of Affordable Rental Housing: Creating and Using a New Database

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Abstract

In a study recently released by the Hudson Institute, the authors reported on the dynamics of affordable rental housing during the period between 1985 and 2013. In this article, we describe the data used in that analysis, present some of the most important findings, and explain how to obtain the data and the documentation, as well as the study.

Introduction

Housing assistance for low-income households has been a public policy objective since the 1930s, and housing has long been recognized as part of the social safety net. Assistance is not, however, an entitlement, and a large share of the housing occupied by low-income families is provided privately, both with and without federal support. As a result, little is known about the affordable rental stock, particularly how it has changed over time. Taking advantage of the longitudinal nature of the American Housing Survey (AHS) between 1985 and 2013, we have created a longitudinal database covering the whole period and analyzed the changes in the affordable rental stock during those years (Weicher, Eggers, and Moumen, 2017). This article briefly describes the creation of the database and summarizes the empirical results of the analysis.

The study used all 15 national AHSs derived from the sample drawn in 1985 and augmented through 2013. We classify rental units, both occupied and vacant, as affordable, moderate, or high rentals by comparing gross rent to local family median income with adjustment for the number of bedrooms. Once units enter the AHS sample, their status can vary across surveys. Possible statuses are rental (differentiated by affordability), owner stock, use as seasonal or second homes, temporarily out of the stock, or permanently out of the stock. We observed both stability and substantial variation with respect to status in the paths followed by units across surveys. A number of issues had to be resolved before analyzing the data. A fundamental issue was how to identify those rental units that are assisted; we used two approaches to solve this problem. The next section discusses these issues and describes how we resolved them.

We looked at the dynamics of affordable rental housing in three ways. First, we tracked the career paths of all units from either 1985 or the time they entered the housing stock until either 2013 or when they left the housing stock permanently. Second, we report on what happened by 2013 to those units that were affordable rentals in 1985 and also on where those units came from that were affordable rentals in 2013. Finally, we aggregated affordable rental housing across all 15 surveys and identified the types of units that provided that housing. In the third section, we report some of the more interesting findings from these analyses.

The concluding section explains how to obtain a copy of the report. It also describes the datasets available for use by others and indicates how to acquire them.

Data, Definitions, and Issues

We use a sample of 65,540 housing units obtained from the AHS that the U.S. Department of Housing and Urban Development (HUD) sponsors and the U.S. Census Bureau conducts. The sample was drawn in 1985; 66 percent of our units come from that original 1985 sample. HUD and the Census Bureau have added to the 1985 AHS sample with each survey to represent units that have entered the housing stock through new construction or by other means. The remainder of our sample comes from these additions through 2013, the end year of our analysis and the final year of data collection for this AHS sample.

Once a unit is in the AHS sample, the Census Bureau surveys the household occupying that same unit every 2 years, enabling us to observe changes in both housing units and their occupants over time. The sample is large and was carefully designed to represent the housing stock nationwide, and the information on both the housing units and its occupants is detailed and consistently reported. Like the Census Bureau, we weight each observation so that the sample of 65,540 observations can represent the 156 million housing units that were in the housing inventory for all or some of the years between 1985 and 2013. In order to adjust for some problems with the AHS sample, we have had to modify the pure weight assigned to each unit by the Census Bureau.

Our definition of affordable rental housing is—

A rental unit is affordable if the sum of rent, utilities, and related costs, adjusted for the number of bedrooms, is less than or equal to 30 percent of 50 percent of local area median income.

This definition takes both costs and income into account. Affordability improves (or worsens) as either housing costs decrease (or increase) or household incomes increase (or decrease). “Fifty percent of local area median income” is the HUD definition of very low income and is also the standard for eligibility for assisted housing. “Thirty percent” is the required contribution of income from tenants of assisted housing and is supposed to represent a reasonable boundary between what a family should spend for housing and what it should spend on other goods. The bedroom adjustment recognizes that an affordable rent for a two-bedroom unit would not be the same as an affordable rent for a one-bedroom unit.

Resolving Data Issues

In the course of the study, we identified several special issues. We addressed them in ways that we considered appropriate for this study.

- **Missing data:** Not all units in the survey provided complete interviews. We filled in missing values for various questions using the status of the unit in an adjoining survey—taking the response from the nearest survey. If two surveys were equally near with different responses, we chose the previous survey if the unit’s control number was odd and the next survey if the control number was even. We had to allocate responses in 1 year for 12,041 units and in 2 or more years for 8,882.
- **Sample reduction:** For the 2007 and 2009 surveys, about 5,000 units were dropped from the sample for cost considerations. These units returned to the survey in 2011. We employed our allocation procedures for missing data to fill in responses for the two surveys.
- **Median income adjustments:** Through 2005, HUD calculated median incomes for metropolitan areas or nonmetropolitan counties using the most recent decennial census. In 2007, HUD changed its methodology, using the American Community Survey (ACS). HUD observed that the income data from the ACS tended to be lower than the income data from the decennial census. We used the data from the 2005 and 2007 ACS surveys to make the 2007 and later local median incomes consistent with the 2005 and earlier local median incomes.

- Variation in bedroom counts: For nearly one-half of our sample units, respondents provided the same count of bedrooms in each survey; slightly more than one-half (51.4 percent) had more than one count of the number of bedrooms. To see how serious this variation might be, we did an alternative analysis in which we limited the variation in bedroom counts.
- Units not included in all surveys: From time to time, the AHS for a given year contains information for some units that is not available in other years. A special mobile home sample was added for only the 2005 survey, for example, and units were added in 2011 and retained in 2013 to enhance the sample. We eliminated these units from our database, because we did not have information about them for each survey and could not use them as part of our longitudinal analysis.

Assisted Housing

Identifying assisted housing has been a difficult problem in the AHS. Until 2011 identification of assisted units had to be based on the household interviewee's response to questions about assistance. Unfortunately, these responses have not been a satisfactory method for identifying units receiving assistance. Many more households have reported receiving housing assistance in the AHS than were actually receiving assistance, according to HUD program data.¹ The problems with the AHS in this regard have been recognized for many years. HUD's efforts to address them have included several revisions of the questionnaire, most recently in 1997.²

We have addressed these problems in two ways. First, we used the consistency of AHS responses to identify assisted units. We classified units that were always or nearly always identified as "assisted" by the responding occupant as being assisted through the entire period. Units that were infrequently identified as "assisted" were classified as not being assisted. Although the data are imprecise in any one survey, we considered this to be the best available method of identifying households that received assistance that was tied to the units. Second, we made use of program information on assistance status that has been provided only for the 2011 and 2013 surveys. In those surveys, HUD-assisted units were identified by matching the address of the sample unit to the administrative records for HUD programs. Units that were either public housing or privately owned assisted projects in 2011 or 2013 were identified as assisted back to 1985 or to the first year in which the unit was part of the AHS sample.

Using both approaches, we find that public housing and privately owned assisted housing projects were an important source, but never the predominant source, of affordable rental housing. Assisted housing projects accounted for 21 percent of the affordable rental inventory in 1985 and 16 percent in 2013. We believe that the decline represents the shift of federal housing assistance from project-based assistance to housing vouchers.³

¹ Units assisted in Farmers Home Administration (FmHA) multifamily programs are not identified in the AHS but cannot account for the overreporting of assistance by households in the sample. The Section 514 and 515 programs have 434,000 assisted units, according to FmHA program data that have recently been made available (Sccally and Lipsetz, 2017).

² The 1997 revisions are described in HUD (2000: A-22–A-25) and ICF (2001: 43).

³ HUD data show that project-based assistance reached a plateau around 1984 at about 3.1 million units and peaked in 1995 at about 3.2 million; by 2010, only 2.6 million units were assisted in this manner. No units received housing vouchers or certificates until 1976; by 1988, more than 1 million units were assisted, and by 2002, over 2 million were assisted (Weicher, 2012: Table 4-5).

Overall, the quality of the affordable rental stock improved steadily from 1985 to 2013, using both the standard measure of inadequacy reported in the AHS since the late 1980s and a more detailed measure developed for this analysis. This improvement in quality was also the case for moderate rent and high rent units, and for the owner stock. Not surprisingly, affordable rental units were found to be of lower quality than other rental units or owner units but, for the most part, affordable rental units were of acceptable quality. Assisted housing units were generally of higher quality than unassisted affordable rental but the quality differential had virtually disappeared by 2013 as the assisted stock aged.

Key Findings

Most of our key findings come from either a comparative static analysis that explained the changes in affordable rental housing between 1985 and 2013 or an aggregate analysis, which we termed “unit-years,” that examined the sources of affordable rental housing over all 15 surveys.

Counting Affordable Units

To track the “career path” of a housing unit, we classify it as being in one of eight statuses at the time of each of the 15 AHS surveys from 1985 and through 2013. The eight statuses and the numbers we assign to them⁴ are—

- 0 Not yet in the sample
- 1 Affordable rental unit
- 2 Moderate rental unit
- 3 High rental unit
- 4 Owner unit
- 5 Seasonal unit or second home
- 7 Temporarily out of the housing stock
- 8 Permanent loss from the housing stock

A moderate rent unit is defined in a similar manner to an affordable unit; the sum of rent, utilities, and other costs must be “greater than 30 percent of 50 percent of local area median income, and less than or equal to 30 percent of 80 percent of local area median income.” A high-rent unit has housing costs “greater than 80 percent of local area median income.” We include vacant units in categories 1 through 3 if they are vacant for rent, vacant for rent or sale, or rented but not yet occupied, and in category 4 if they are vacant for sale only or sold but not yet occupied. All other vacancies, such as seasonal use only, are put into category 5. Temporary losses include units used for nonresidential purposes or units needing repairs to be habitable. By 2013, 7,447 of our sample units had become permanent losses.

⁴ In the first stage of our analysis, we assigned a value of “6” to units with missing information on status in a given year. In subsequent stages, we assigned a status value for that year using the procedure described previously.

Using these statuses, we identify 25,642 unique paths that our sample units took during the course of the 15 surveys. The most common path is “always owner-occupied” from 1985 through 2013; 12,279 sample units take this path, 18.7 percent of the sample. The second most common is always affordable rental housing from 1985 through 2013; the 1,388 sample units that take this path constitute 2.1 percent of the sample. The next 14 most common paths are units that entered the sample after 1985 and were always owner-occupied, once they did so—units entering the sample in 1987, for example.

At the other end of the distribution, 22,488 units take unique paths; only one unit in the sample follows that path. These unique paths constitute 34.3 percent of the sample, more than the number of units that were always owner occupied once they entered the sample. Only two units each follow another 1,456 paths. Put another way, only one unit follows 87.7 percent of the paths, and only two units each follow another 5.7 percent. The career paths followed by housing units are many and diverse.

Comparative Statics: Looking Backward and Forward

Affordable rental housing has constituted a remarkably stable share of the total stock. The proportion was 14.8 percent in both 1985 and 2013. During the period, the share never rose above 16.4 percent or fell below 14.5 percent. With the growth of the housing stock, the number of affordable rental units rose from 15.0 million in 1985 to 19.7 million in 2013. These additional units came from three sources (as exhibit 1 shows).

- Rental units that were not affordable in 1985 but became so by 2013—4.6 million units.
- Housing units that were not rental in 1985; they were part of the owner stock or were seasonal or second homes—3.8 million owner units (owner-occupied or available for sale) and 0.5 million whose occupants had a usual residence elsewhere (URE), such as seasonal housing units or second homes.

Exhibit 1

Backward-Looking Analysis: Where Did the 2013 Affordable Rental Stock Come From, Vis-à-Vis 1985?

Status in 1985	Frequency	Percent of 2013 Affordable Rental Stock
Affordable	6,243,000	31.7
Were in higher rent categories	4,615,000	23.4
Were owner stock	3,845,000	19.5
Were seasonal/URE stock	463,000	2.3
Were temporarily out of the housing stock	200,000	1.0
Were additions to stock	4,337,000	22.0
New construction	2,557,000	13.0
Other additions	1,780,000	9.0
Total	19,702,000	100.0

URE = usual residence elsewhere.

- Units that did not exist or did not provide housing in 1985—4.5 million, of which 2.5 million were new construction; 1.8 million were added to the stock by merging two or more units into a single unit, splitting one unit into two or more, or conversion from other purposes; and 0.2 million were temporarily out of the housing stock in 1985.

Looking forward from 1985, about 6.2 million affordable rental units were also affordable rentals in 2013. The other 8.8 million were no longer affordable, or no longer rental, or no longer provided housing (as exhibit 2 shows).

- Affordable rental units in 1985 that were still rental in 2013 but not affordable—1.7 million units.
- Units that were no longer rental—2.7 million, of which 1.9 million were in the owner stock and 0.8 million were no longer primary residences but had become UREs, such as seasonal or second homes.
- Units that had been lost to the housing stock—4.3 million, of which 4.0 million were permanent losses and 0.3 million were temporary losses that could be reversible.

Thus the most common reason for losses from the affordable rental stock between 1985 and 2013 was that the unit was no longer providing housing—it was permanently lost. During the same period, the most common source of additional affordable rental housing was the higher rent stock.

Exhibit 2

Forward-Looking Analysis: What Happened to the 1985 Affordable Rental Stock by 2013?

Status in 2013	Frequency	Percent of 1985 Affordable Rental Stock
Still affordable	6,243,000	41.7
Gentrified	1,722,000	11.5
Owner stock	1,884,000	12.6
Seasonal, URE, or similar	791,000	5.3
Temporary, reversible loss	276,000	1.8
Permanent loss to housing stock	4,053,000	27.1
Total	14,969,000	100.0

URE = usual residence elsewhere.

Comparative Statics: Looking Both Ways

Exhibit 3 puts the gains and losses together to account for the increase in the number of affordable rental units. Of the additional 4.7 million affordable rental units, only 0.2 million came from net additions to the housing stock; the losses nearly matched the number of new units. The other 4.5 million came as a result of changes within the 1985 existing housing stock; 2.9 million from changes in the rent levels of the 1985 rental stock, units that filtered down exceeding those that gentrified; and 1.6 million from tenure shifts between owned or URE units and rental housing. The net increase from filtering is nearly twice as important as the net increase from tenure shifts, and far more important than the net increase from new construction and demolitions (and other sources of additions or removals). The gross increases are very similar—4.6 million from filtering,

Exhibit 3

Accounting for the Net Change Between 1985 and 2013

	Frequency
1985 affordable rental stock	14,971,000
New construction or other additions	4,537,000
Demolitions or other losses	4,330,000
Net effect	207,000
Filtering—becoming affordable	4,615,000
Gentrifying—rising rents	1,722,000
Net effect	2,892,000
Tenure shift—owned or URE/seasonal to affordable rental	4,307,000
Tenure shift—affordable rental to owned or URE/seasonal	2,675,000
Net effect	1,632,000
Net addition	4,732,000
2013 affordable rental stock	19,702,000

URE = usual residence elsewhere.

4.5 million from new construction and other additions, 4.3 million from the nonrental housing—but fewer units are lost from gentrification than from tenure shifts and far fewer than from demolitions and other losses.

Sources of Affordable Housing During 1985–2013

To look at affordable rental housing *throughout* the entire period, we developed the concept of unit-years of housing. If 100 units furnish affordable rental housing for 10 years, we record this activity as 1,000 *unit-years* of affordable rental housing. Similarly, 100 units furnishing 10 years of owner-occupied housing would be said to provide 1,000 unit-years of owner stock. Of course, the same unit can provide unit-years of different types of housing, for example, 8 unit-years of affordable rental, 4 unit-years of seasonal housing, and 10 unit-years in the owner stock. Units following a variety of paths can provide unit-years of affordable rental housing.

During the entire period, about 535 million years of affordable rental housing existed—about 17.9 million units each year on average. The largest contributors to affordable housing during these years are diverse and quite surprising.

- The largest contributors to affordable rental housing throughout the years were the 44 million units that were most often part of the owner stock but were affordable rentals for less than one-half of their time in the housing stock. These units accounted for 24.4 percent of all affordable rental housing. On average, they were affordable rentals for 3 years out of the 30.
- Another 5.8 million units served both the owner and renter sectors but were affordable rentals for one-half or more of their time in the housing stock. These units provided nearly 18 years of affordable rental housing on average and accounted for 19.1 percent of all affordable rental housing.
- Taken together, units that were both rental and owner (or seasonal) accounted for 43.5 percent of all affordable rental housing.

- The 3.5 million assisted units accounted for 17.8 percent of all affordable rental housing.
- The 20.8 million units that were permanently lost by 2013 accounted for 12.1 percent of all affordable rental housing.
- The 2.8 million units that were always rental and affordable for one-half or more of their time in the housing stock accounted for another 10.3 percent.
- The 6.1 million units that were always rental but affordable for less than one-half of their time in the housing stock accounted for another 6.3 percent. These last two categories encompass most units that were filtered or gentrified.
- Often filtration is thought of as a smooth process in which units move from high rent to moderate rent to affordable. We found only 1.1 million units that followed this path, and they accounted for 2.6 percent of all affordable rental housing. Further analysis shows that 80 percent of these units were never high rent during the period studied.
- Similarly, gentrification is often thought of as a smooth process from affordable to moderate rent or high rent. We found only 0.4 million units that followed this path, accounting for 0.7 percent of all affordable rental housing.
- Private units that were always affordable, and units that were always affordable except for one survey, accounted for the remaining 6.8 percent of all affordable rental housing.
- Finally, 65.7 million units were never rental and another 3.3 million units were always either moderate or high rental.

Looked at another way, close to one-third of all affordable rental housing during the period was provided by units that were affordable rentals for less than one-half their time in the housing stock.

Conclusion: Accessing the Databases and Our Analysis

In the course of our research, we created two databases and documented the construction of each database and the special variables they contain. The databases, documentation, and the full study, “The Long-Term Dynamics of Affordable Rental Housing,” are available on the Hudson Institute website at <https://www.hudson.org/research/13340-data-for-the-long-term-dynamics-of-affordable-rental-housing>.

The first database, *hudson_institute_file_1*, contains 95,444 observations and 2,164 variables. This file merges all 15 AHS national surveys based on the sample drawn in 1985 and extracts key AHS variables. New variables were created for use in the merging and cleaning of the individual AHS files for each survey. We also appended relevant variables from HUD’s Housing Affordability Data System and the Census Bureau’s Where Did They Go file, which contains historic information on all units that are part of the national sample. Finally, we eliminated units that were part of supplemental samples used in some but not all the AHS surveys.

The second database, *hudson_institute_file_2*, contains 65,540 observations and 3,728 variables. The second file modifies the first by eliminating cases that were absent from too many AHS

surveys, cases with too much missing information on affordability, and cases that were defective in other respects. It also standardizes descriptive variables based on 2013 values or the most recent values if 2013 data are missing. Further, the file includes a new bedroom variable that reduces survey-to-survey variation in the bedroom count, a variable identifying assisted project-based housing, the weights used in our analyses, and several special variables created for our analysis.

Hudson_institute_file_1 is designed for researchers who want to conduct different analyses than ours but also want to avoid the work of merging the files and extracting the data. *Hudson_institute_file_2* is available to researchers who want to conduct longitudinal analyses of housing policy issues and take advantage of some of the special features developed in the course of our study.

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References

ICF Consulting (ICF). 2001. "Documentation of Changes in the 1997 American Housing Survey." huduser.org/portal/datasets/ahs/docchg1997.pdf.

Scally, Corianne Payton, and David Lipsetz. 2017. "New Public Data Available on USDA Rural Housing Service's Single-Family and Multifamily Programs," *Cityscape* 19 (1): 295–304.

U.S. Department of Housing and Urban Development (HUD). 2000. *Rental Housing Assistance – The Worsening Crisis: A Report to Congress on Worst Case Housing Needs*. Washington, DC: Government Publishing Office.

Weicher, John C. 2012. *Housing Policy at a Crossroads: The Why, How, and Who of Assistance Programs*. Washington, DC: AEI Press.

Weicher, John C., Frederick J. Eggers, and Fouad Moumen. 2017. *The Long-Term Dynamics of Affordable Rental Housing*. Washington, DC: Hudson Institute.