AMERICAN HOUSING SURVEY

Rental Market Dynamics

2007 - 2009

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

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American Housing Survey

Rental Market Dynamics: 2007-2009

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Executive Summary

This report examines changes in the rental housing market between 2007 and 2009 with particular emphasis on the affordability of rental housing. Using data from the American Housing Surveys conducted in those years, it answers such questions as: "Have the number of rental units affordable to households with very low incomes increased or decreased over the period?" or "What happened to the rental units that were affordable to low-income households at the beginning of the period?"

This paper looks at all units in the rental housing market—occupied rental units, vacant rental units, vacant units offered for sale or rent, and units rented but not yet occupied—and classifies these units into eight categories:

- Non-market – either no cash rent or a subsidized rent.
- Extremely low rent (affordable to renters with incomes less than or equal to 30 percent of local area median income).
- Very low rent (affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income).
- Low rent (affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income).
- Moderate rent (affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income).
- High rent (affordable to renters with incomes greater than 80 percent but less than or equal to 100 percent of local area median income).
- Very high rent (affordable to renters with incomes greater than 100 percent but less than or equal to 120 percent of local area median income).
- Extremely high rent (affordable to renters with incomes greater than 120 percent of local area median income).

For each category, "affordable" is defined as a ratio of gross rent-to-income of 30 percent or less for the higher of the incomes that define the boundaries for that category.[1] The categories are defined relative to local area median income, and therefore the boundaries of the categories will change as local area median income changes. For example, if local area median income increases between 2007 and 2009, then the upper boundaries of each category will also increase between 2007 and 2009.

Table ES-1 on the next page shows that the rental stock, defined to include vacant units, increased by 693,600 between 2007 and 2009. However, the two most affordable categories—non-market units and extremely low rent units—both experienced sizable declines between 2007 and 2009. Very low rent units appeared to have grown some, and there is solid evidence of growth among low rent units. The three lowest categories declined by approximately 1.8 million

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[1] Gross rent is rent plus utilities.

units. When low rent units are included in the group, the decline is approximately 1.0 million units.[2]

Table ES-1: Changes in Rental Stock between 2007 and 2009

Affordability Categories	2007 Rentals	2009 Rentals	Change
Non-market	8,460,800	6,944,900	-1,516,000
Extremely Low Rent	2,262,100	1,692,200	-569,900
Very Low Rent	9,308,600	9,615,100	306,500
Low Rent	6,290,500	7,039,600	749,100
Moderate Rent	7,649,600	8,715,700	1,066,000
High Rent	2,431,900	2,971,200	539,300
Very High Rent	1,396,100	1,620,100	224,000
Extremely High Rent	1,912,600	1,807,100	-105,500
Total	39,712,300	40,405,900	693,600

The number of units in any particular category can increase or decrease for a variety of reasons, including movements of units from one affordability category in 2007 to a different affordability category in 2009, movements of units between rental-occupancy and owner-occupancy, and the addition or loss of rental units from the housing stock. The dynamics reported in this table resulted predominately from the combination of three factors:

- A major decline in additions to the rental housing stock, particularly in new construction.
- A substantial increase in the *net* flow of units from the owner stock to the renter stock.
- Large flows among affordability classes in which the most affordable and least affordable categories experienced the largest net outflows.

Focusing only on non-market, extremely low rent, and very low rent units, net movement into other affordability categories accounted for over 90 percent of the measured decline.

Because of the unusual economic conditions of the 2007-2009 period, this report compares the pattern of rental dynamics between 2007 and 2009 to the patterns between 2003 and 2005 and between 2005 and 2007. The 2003-2005 period preceded both the financial crisis and the recession; the 2005-2007 period includes the early part of the financial crisis and the end of the previous economic expansion; and the 2007-2009 period falls squarely in both the financial crisis and the recession.

Additions to the rental stock from both new construction and other additions declined from period to period. (Other additions include the merging or splitting of units and the movement of structures between the residential and commercial sectors.) New construction provided 1.9 percent of the 2005 rental stock, 1.6 percent of the 2007 rental stock, and 1.5 percent of the 2009 rental stock; other additions accounted for 1.6 percent of the 2005 rental stock, 1.3 percent of the 2007 rental stock, and 1.1 percent of the 2009 rental stock.

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[2] Table 12 of this report (page 19) uses four different techniques to estimate these changes; the numbers from column B of Table 12 are used in this paragraph.

Gains from the owner stock and losses to the owner stock also displayed a very clear pattern. In the period before the financial crisis struck, 8.8 percent of the 2003 rental stock went to owner use in 2005, while 8.7 percent of the 2005 rental stock came from the 2003 owner stock. The actual flows were 3,360,000 rental units in 2003 to owner units in 2005 and 3,366,000 owner units in 2003 to renter units in 2005. The two flows canceled each other out. In the most recent period, 7.0 percent of the 2007 rental stock went to owner use in 2009, while 9.9 percent of the 2009 rental stock came from the 2007 owner stock. The actual flows were that 2,772,000 rental units in 2007 became owner units in 2009 and 3,999,000 owner units in 2007 became renter units in 2009, a net gain of 1,227,000 units for the 2009 rental stock.

Rental Market Dynamics: 2007-2009

Overview

This paper answers two questions:

- Did the number of rental units affordable to lower income households grow or decline between 2007 and 2009?

  and

- What factors caused the number of affordable rental units to grow or decline during this period?

The first section provides background on these issues and deals with methodological and data concerns. The American Housing Survey (AHS) provides the data, but the analysis employs weights different from the regular AHS weights. For this reason, the first issue is whether the regular AHS weights and the weights used in this analysis tell the same story about changes in rental housing between 2007 and 2009. Tables 1 and 2 compare the stories and concludes that they are similar enough to continue with the analysis. Tables 3 and 4 paint a precise picture, by affordability category, of what happened between 2007 and 2009 to the rental units available in 2007. This picture answers the posed questions only partially, because Tables 3 and 4 provide information on only those 2009 rental units that were also rental units in 2007; they contain no information on newly constructed rental units or units that were rental in 2009 but not rental in 2007. Tables 6 and 7 contain information on new construction and the movement of units from non-rental status in 2007 to rental status in 2009. They paint a precise picture, by affordability category, of where the units available for rent in 2009 came from in terms of their status in 2007. However, this picture also answers the posed questions only partially because it depicts only part of the 2007 rental stock; it does not provide information on units that were rental in 2007 but ceased to be part of the rental stock in 2009.

This paper then combines the two pictures, even though the weights used in the separate pictures are not consistent. Tables 10 and 11 present two different combinations of the earlier analyses and explain how the combinations were constructed. Table 12 gathers information from Tables 10 and 11 to answer the two questions. Because weights are not fully consistent, Table 12 cannot measure precisely the increase or decrease in affordable units or how much of the increase or decrease is due to factors such as the movement of units from one affordability category to another. However, there is enough consistency in the two analyses to draw reasonable conclusions about the direction and magnitude of changes in the number of units in most of the affordability categories, the relative contribution to these changes of the movement of units across affordability categories, and the gain or loss of units from the rental stock.

Background and Methodology

Rental market dynamics focuses on the supply of rental housing and how that supply changes over time. Rental dynamics analysis has many of the features of components of inventory change (CINCH) analysis, which seeks to explain how units change characteristics, e.g., high rent or low rent, or change status, e.g., in the stock or out of the stock. Like CINCH, rental dynamics traces where units come from and where they go to, but with an emphasis on low rent units. This paper is part of a larger research project that includes several research studies using the AHS. One of these studies, *Components of Inventory Change: 2007-2009,* undertook a CINCH analysis using the 2007 and 2009 national AHS surveys.[3] This paper is another of the research studies; the earlier companion piece made the work of this paper easier.

A key step in rental dynamics analysis is separating the rental stock into classes or strata based on how affordable they are. This paper uses eight categories:

- Non-market – either no cash rent or a subsidized rent.
- Extremely low rent (affordable to renters with incomes less than or equal to 30 percent of local area median income).
- Very low rent (affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income).
- Low rent (affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income).
- Moderate rent (affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income).
- High rent (affordable to renters with incomes greater than 80 percent but less than or equal to 100 percent of local area median income).
- Very high rent (affordable to renters with incomes greater than 100 percent but less than or equal to 120 percent of local area median income).
- Extremely high rent (affordable to renters with incomes greater than 120 percent of local area median income).

For each category, "affordable" is defined as a gross rent-to-income ratio of 30 percent or less for the higher of the incomes that define the boundaries for that category.[4] The categories are defined relative to area median income, and therefore the boundaries of the categories will change as area median income changes. For example, if area median income increases between 2007 and 2009, then the upper boundaries of each category will also increase between 2007 and 2009.[5]

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[3] *Components of Inventory Change: 2007-2009*, Frederick J. Eggers and Fouad Moumen, a report prepared for the Department of Housing and Urban Development by Econometrica, Inc., April 2011. This report is available at http://www.huduser.org/datasets/cinch.html.
[4] Gross rent is rent plus utilities.
[5] This means that rental costs and affordability do not always move in the same direction. For example, if the costs of renting a unit are $610 in 2007 and $640 in 2009, while the upper boundary of the low-income category changes from $600 to $650 between 2007 and 2009, then the unit that was classified as moderate income in 2007 will be classified as low income in 2009 despite higher rental costs.

The AHS provided the data used in this analysis. The AHS is well suited for this purpose. It is a large, nationally representative sample of the housing stock. The AHS gathers information on the same housing units at 2-year intervals. Following the same unit over time allows the analysis to track changes in how units serve the housing market.

This paper also used two related data sets that greatly facilitated the analysis:

- Housing Affordability Data System (HADS)[6]
- 2007-2009 CINCH variables and weights.[7]

HADS is a housing-unit-level data set that measures the affordability of housing units and the housing cost burdens of households relative to area median incomes, poverty level incomes, and HUD Fair Market Rents. HADS contains two important variables not available in the regular AHS data set. The first is OWNRENT, which classifies units as either owned or rented.[8] It differs from the AHS variable TENURE in two respects. First, OWNRENT has two states: owned or rented. TENURE has three states: owned, rented for cash, or rented for no cash rent. More importantly, OWNRENT applies to all occupied or vacant units, whereas TENURE does not apply to vacant units.[9,10] HADS also contains variables that classify all units by the cost of the unit relative to adjusted median income in the locality where the unit is located. From this set of variables, this paper uses COSTMedRELAMICAT in 2007 and 2009, which puts the unit into one of seven categories based on the ratio of total monthly housing costs to monthly adjusted median income for the locality.[11] Except for the non-market classification, these seven categories match the eight categories used in this paper.

The CINCH variables and weights data set was a product of the companion research report. For all AHS units, the data set contains (1) a set of forward-looking CINCH weights (FLCINCHWT) that allow one to track from 2007 to 2009 those units that were part of the 2007 housing stock and (2) a set of backward-looking CINCH weights (BLCINCHWT) that allow one to track from 2009 to 2007 those units that were part of the 2009 housing stock. This paper uses these weights for the rental dynamics analysis.

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[6] HADS is a data system developed by the Office of Policy Development and Research, U.S. Department of Housing and Urban Development. The HADS files and documentation are online at http://www.huduser.org/datasets/hads/hads.html. When this analysis was performed, the 2009 HADS data had not yet been released. The authors compiled the HADS data using SAS code provided by HUD.

[7] The data set and documentation are available at http://www.huduser.org/datasets/cinch.html.

[8] Here and elsewhere in this paper, words printed with all capital letters are the names of variables in different data sets. Exceptions include abbreviations such as AHS, CINCH, and HADS.

[9] OWNRENT counts vacant units with VACANCY values of 1, 2, or 4 as rental, and those with VACANCY values of 3 or 5 as owned. No-cash-rent units are classified as rental.

[10] TENURE also does not apply to units whose occupants usually reside somewhere else or to units that were not interviewed because they were temporarily or permanently out of the housing stock. OWNRENT does not apply to these units either.

[11] The set of variables with "COSTXXRELAMICAT" applies to both owner-occupied and rental units. The XX refers to the interest rate applied to a hypothetical mortgage on owner-occupied properties. HADS databases usually provide four alternative COSTXXRELAMICAT variables based on four different values for the interest rate on the hypothetical mortgage. One of the choices is the median interest rate for that survey year. We chose that option.

The CINCH variables and weights data set also contains other variables that are important for the rental dynamics analysis and that are not found in the regular AHS data set. FLSTATUS indicates whether a 2007 housing unit was also in the 2009 housing stock or whether it had been lost to the stock for one of six reasons. BLSTATUS indicates whether a 2009 housing unit was also in the 2007 housing stock or whether it had been added to the stock for one of six reasons. The CINCH data set includes four additional variables that were constructed from OWNRENT and COSTMEDRELAMICAT in HADS. These variables (FLRENT, BLRENT, FLAFFORD, and BLAFFORD) classify rental units in 2007 and 2009, respectively, into one of the eight categories used in this paper.

Affordability Changes in the Rental Stock

Before presenting the results using CINCH weights, this paper investigates whether the CINCH weights and the AHS weights depict similar changes in the rental stock between 2007 and 2009. This paper will use the CINCH weights discussed in the Background and Methodology section to analyze changes in the affordability of the rental stock. This paper uses the CINCH weights instead of the regular AHS weights because the analysis in this paper uses mainly units that were interviewed in both years. Excluding units that were not interviewed requires adjustments to the regular AHS weights. The companion CINCH report compared CINCH estimates to published AHS totals. Almost all of the CINCH estimates are within 5 percent of the AHS published totals, and many are very close to the AHS estimates.[12] Relevant to this report, the CINCH weights underestimate the number of rental units with no cash rents by 8.7 percent in 2007 and by 13.5 percent in 2009.

Comparing the regular AHS weights with the CINCH weights presents some added difficulties for the 2007 and 2009 period. The 2009 AHS file contains a large number of extra cases for the following five metropolitan areas: Chicago, Detroit, New York City, northern New Jersey, and Philadelphia. These units are part of a routine AHS oversample to permit periodic separate analyses for these areas. As a result, the 2009 weights for the units in these areas that are also in the 2007 are substantially smaller than their weights in 2007 to accommodate the supplement samples. We cannot use the supplement samples because we have no information on these units in 2007. To correct for this problem, we adjusted the AHS weights for the units that we were able to used from these five areas. In addition, there was an increase in the rental vacancy rate, which may affect the comparison.

Using regular AHS weights and the affordability classifications produced by HADS, Table 1 counts the number of occupied or vacant rental units in 2007 and 2009 and classifies them into one of eight affordability categories. The regular AHS weights provide a benchmark for the rental dynamics analysis. According to the regular AHS weights, the rental stock—including

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[12] There were two areas where the CINCH weights appeared to vary systematically from the regular AHS weights. The CINCH weights overestimate the number of units outside of metropolitan areas by 19.5 percent in 2009 but only by 3.2 percent in 2007 and overestimate units with a householder over age 65 by 7-10 percent in 2007 and by 10-13 percent in 2009.

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both occupied and vacant units—decreased by 305,000 units between 2007 and 2009, which is a 0.8 percent decrease.[13]

Table 1: Rental Units by Affordability Class, 2007-2009, using regular AHS weights and HADS designations (all counts in thousands)

Rent Groups	Rental in 2007	Rental in 2009	Change	Percent Change
Non-market	7,808	6,268	-1,540	-19.7%
Extremely Low Rent	2,027	1,532	-495	-24.4%
Very Low Rent	8,826	8,825	-1	0.0%
Low Rent	5,864	6,405	541	9.2%
Moderate Rent	7,027	7,809	782	11.1%
High Rent	2,214	2,644	430	19.4%
Very High Rent	1,262	1,412	150	11.9%
Extremely High Rent	1,705	1,535	-170	-10.0%
Total	36,735	36,430	-305	-0.8%

Table 2 counts the number of occupied or vacant rental units in 2007 and 2009 and classifies them into one of eight affordability categories based on the CINCH weights. The rental dynamics analysis in the remainder of this paper will focus on the changes identified in Table 2. According to the CINCH weights, the rental stock—including both occupied and vacant units—increased by 678,000 units between 2007 and 2009, a 1.7 percent increase.

Table 2: Rental Units by Affordability Class, 2007-2009, using CINCH weights and HADS designations (all counts in thousands)

Rent Groups	Rental in 2007 from Forward-Looking Analysis	Rental in 2009 from Backward-Looking Analysis	Change	Percent Change
Non-market	8,482	6,945	-1,537	-18.1%
Extremely Low Rent	2,271	1,705	-566	-24.9%
Very Low Rent	9,364	9,652	288	3.1%
Low Rent	6,323	7,084	761	12.0%
Moderate Rent	7,697	8,793	1,096	14.2%
High Rent	2,455	2,994	539	22.0%
Very High Rent	1,409	1,631	222	15.8%
Extremely High Rent	1,936	1,810	-126	-6.5%
Total	39,939	40,617	678	1.7%

From an overall perspective, the two sets of weights produce two different conclusions. The AHS weights indicate a very small decrease in the number of occupied and vacant rental units, while the CINCH weights suggest a small increase. The published AHS reports show an increase of 499,000 rental units, including units vacant for rent, between 2007 and 2009 (1.3 percent).

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[13] Throughout the paper, sums and differences of counts or percentages may not equal the reported sums and differences or percentages because of rounding.

The CINCH weights count more rental units: 39,939,000 in 2007 compared to 36,735,000 from the AHS weights, as well as 40,617,000 in 2009 compared to 36,400,000 from the AHS weights. The differences in total counts are large, approximately 10 percent in both cases. However, the AHS published numbers for renter-occupied and vacant for rent units are much closer to the CINCH estimates: 38,897,000 for 2007 and 39,396,000 for 2009—within roughly 3 percent in both years.

The pattern of changes recorded in Table 2 parallels the changes in Table 1 closely, including:

- Both tables record large absolute and percentage declines in non-market units and extremely low rent units.
- Both tables record large absolute and percentage increases among low rent, moderate rent, high rent, and very high rent units.
- Both tables record modest absolute and percentage decreases in extremely high rent units.

The most important difference involves very low rent units. The AHS weights indicate virtually no change in the number of low rent units, whereas the CINCH weights generate a modest 3.1 percent increase.

Despite the differences noted, the AHS and CINCH weights paint similar pictures of the changes in the rental stock between 2007 and 2009.

Rental Dynamics Tables

An ideal rental dynamics analysis would provide an exact accounting of the following form for each of the eight rental affordability categories:

2009 rental stock in category x = 2007 rental stock in category x
– 2007 rental units in category x that moved to another category
– 2007 rental units in category x that become owner-occupied or seasonal in 2009
– 2007 rental units in category x that are lost to the stock by 2009
+ 2007 rental units not in x that moved into category x
+ 2007 owner-occupied or seasonal units that become rental units in category x in 2009
+ newly constructed rental units in category x
+ other additions to the rental stock in category x.

This accounting is an expanded form of the standard CINCH problem. Experience in CINCH analysis has shown that it is difficult to create a set of weights that accomplishes such an accounting.[14] The solution in CINCH has been to split the problem into two separate questions: forward-looking CINCH analysis takes the 2007 housing stock and explains what happens to

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[14] See *Weighting Strategy for 2007-2009 CINCH Analysis,* available at http://www.huduser.org/datasets/cinch.html.

those units by 2009, and backward-looking CINCH analysis takes the 2009 housing stock and explains where those units came from in terms of the 2007 housing stock. This paper will follow the same approach.

Forward-Looking Rental Dynamics

Table 3 tracks how 39,712,000 rental units in the 2007 housing stock relate to the 2009 housing stock.[15] Columns B through L explain where the 2007 rental units fit into the 2009 housing stock.

- If the units are still rental in 2009, they will be counted in columns B through I, depending upon how affordable they are in 2009.
- If the units have become owner-occupied, they will be counted in column J.
- Seasonal units, units that are not the primary residence of their occupants, units used for migratory workers, and units that are vacant but not for rent or sale are counted in column K.
- Column L counts 2007 units that are not in the 2009 housing stock; these can be either temporary or permanent losses to the stock.

The sum of columns B through L equals column A, except for rounding.

Table 4 presents the same information as Table 3, but columns B through L are now percentages of column A. Columns B through L sum to 100 percent in each row.

Over 50 percent of the 2007 non-market units are non-market in 2009 as well. In this case, one might have expected even greater consistency between surveys because non-market units include assisted housing and units that are not rented for cash. Public housing units and units in projects that receive assistance should remain assisted in 2009 unless they have left the stock. (Less than 3 percent of the non-market units were not in the stock in 2009.) Units that received assistance through the housing voucher program and "no cash rent" units can change their status between surveys. Response errors can also account for a change in status, and HUD and the Census Bureau have always experienced difficulty getting accurate answers to the questions on whether renters are receiving assistance.

The next three largest categories in terms of number of units—very low rent units, moderate rent units, and low rent units—also showed a high level of stability, with between 40 and 52 percent of the 2007 units in these categories staying in the same category in 2009. Units that had extremely low rents in 2007 displayed the highest propensity to change status between surveys; only 16 percent of these units were extremely low rent in 2009.

Whether or not a unit remains in the same affordability category depends on the interaction of several factors: the growth rate of household income, changes in utility costs, changes in

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[15] This count differs from the 39,939,000 reported in Table 2 because it excludes units for which we have no information regarding their status in 2009.

Table 3: Forward-Looking Rental Dynamics Analysis, Counts: 2007-2009 (all numbers in thousands)

Affordability Categories	A Total in 2007	B Non-Market in 2009	C Extremely Low Rent in 2009	D Very Low Rent in 2009	E Low Rent in 2009	F Moderate Rent in 2009	G High Rent in 2009	H Very High Rent in 2009	I Extremely High Rent in 2009	J Owner Occupied in 2009	K Seasonal or Related Vacant in 2009	L Lost to Stock in 2009
Non-market	8,461	4,305	279	889	633	754	174	119	124	696	248	239
Extremely Low Rent	2,262	184	362	516	230	241	112	48	92	212	171	95
Very Low Rent	9,309	453	334	4,799	1,425	689	187	109	137	581	387	208
Low Rent	6,290	381	148	1,328	2,529	1,074	118	64	49	339	156	104
Moderate Rent	7,650	382	138	661	1,348	3,539	475	154	115	479	236	122
High Rent	2,432	99	62	136	137	732	834	101	42	166	102	20
Very High Rent	1,396	47	39	55	55	280	282	389	93	84	55	16
Extremely High Rent	1,913	54	69	144	42	178	97	243	735	215	101	37
Total	39,712	5,906	1,431	8,529	6,398	7,486	2,279	1,227	1,387	2,772	1,456	842

Table 4: Forward-Looking Rental Dynamics Analysis, Row Percentages: 2007-2009

Affordability Categories	A Total in 2007 (thousands)	B Non-Market in 2009	C Extremely Low Rent in 2009	D Very Low Rent in 2009	E Low Rent in 2009	F Moderate Rent in 2009	G High Rent in 2009	H Very High Rent in 2009	I Extremely High Rent in 2009	J Owner Occupied in 2009	K Seasonal or Related Vacant in 2009	L Lost to Stock in 2009
Non-market	8,461	50.9%	3.3%	10.5%	7.5%	8.9%	2.1%	1.4%	1.5%	8.2%	2.9%	2.8%
Extremely Low Rent	2,262	8.2%	16.0%	22.8%	10.2%	10.7%	4.9%	2.1%	4.1%	9.4%	7.5%	4.2%
Very Low Rent	9,309	4.9%	3.6%	51.6%	15.3%	7.4%	2.0%	1.2%	1.5%	6.2%	4.2%	2.2%
Low Rent	6,290	6.1%	2.4%	21.1%	40.2%	17.1%	1.9%	1.0%	0.8%	5.4%	2.5%	1.7%
Moderate Rent	7,650	5.0%	1.8%	8.6%	17.6%	46.3%	6.2%	2.0%	1.5%	6.3%	3.1%	1.6%
High Rent	2,432	4.1%	2.6%	5.6%	5.6%	30.1%	34.3%	4.2%	1.7%	6.8%	4.2%	0.8%
Very High Rent	1,396	3.4%	2.8%	4.0%	3.9%	20.1%	20.2%	27.9%	6.7%	6.0%	4.0%	1.1%
Extremely High Rent	1,913	2.8%	3.6%	7.5%	2.2%	9.3%	5.1%	12.7%	38.4%	11.2%	5.3%	1.9%
Total	39,712	14.9%	3.6%	21.5%	16.1%	18.9%	5.7%	3.1%	3.5%	7.0%	3.7%	2.1%

property taxes resulting from changes in property values or changes in tax rates, and changes in the demand for rental units. By itself, growth in median household income will tend to shift units to more affordable categories, whereas increases in utility costs or property taxes by themselves will tend to shift units into less affordable categories. In high demand markets, units will likely become less affordable, whereas in low demand markets, units will become more affordable.

The location of a rental unit within the local rent distribution and the shape of that distribution also affect the extent to which rents can rise or fall. If a large percentage of rental stock has higher rents, then landlords can raise rents in response to rising costs or greater demand with less concern about pricing themselves out of the market. The HADS data system allows us to classify units as to their affordability locally, that is, it classifies units by the ratio of gross rent to local median income. While we do not have enough data to compute the local rental distributions with reasonable precision or at all, we speculate that the low stability among extremely low rent units results because most of these units have rents that are close to the boundary point between extremely low rent and very low rent units. Similarly, the high stability (38 percent) among extremely high rent units probably implies that the distribution of these units is not heavily concentrated near the boundary with very high rent units.

The numbers in Tables 3 and 4 suggest that some rental units move far from their initial category. For example, 7.5 percent of the units that were extremely high rent in 2007 became very low rent in 2009. Although sizeable movements both up and down are possible, the tables probably overestimate the range of movement. The HADS variables used in this paper rely on AHS variables that are subject to allocation, a process by which the Census Bureau assigns values to variables if respondents fail to answer questions. Previous analysis has shown that using data without allocations produces less movement out of an affordability category and fewer changes of more than one category.[16]

Table 5 summarizes what happened to the 2007 rental units by affordability category.

Table 5: Summary of Forward-Looking Rental Dynamics

Affordability Categories	2007 Rental Units (thousands)	To More Affordable Categories in 2009	In Same Affordability Category in Both Years	To Less Affordable Categories in 2009	2007 Rental Units Non-Rental in 2009
Non-market	8,461	NA	50.9%	35.1%	14.0%
Extremely Low Rent	2,262	8.1%	16.0%	54.8%	21.1%
Very Low Rent	9,309	8.5%	51.6%	27.3%	12.6%
Low Rent	6,290	29.5%	40.2%	20.7%	9.5%
Moderate Rent	7,650	33.1%	46.3%	9.7%	10.9%
High Rent	2,432	47.9%	34.3%	5.9%	11.8%
Very High Rent	1,396	54.3%	27.9%	6.7%	11.2%
Extremely High Rent	1,913	43.2%	38.4%	NA	18.4%
Total	39,712	20.4%	44.0%	22.8%	12.8%

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[16] See page 10 of *Rental Market Dynamics: Is Affordable Housing for the Poor an Endangered Species?* at http://www.huduser.org/datasets/ahs/ahsReports.html#2.

Overall, more rental units moved to less affordable categories than moved to more affordable categories—22.8 percent versus 20.4 percent. The pattern by affordable categories is distinctive. The focus here is on the middle six categories, because units in the non-market and extremely high rent categories can change affordability categories in only one direction. Among the three highest rent categories of these six middle categories, a higher proportion of units became more affordable than less affordable. This is the classic filtering down model—that is, as units age, there is a tendency for their rents to decline in relative terms. Among very low rent and extremely low rent units, a higher proportion became less affordable than became more affordable. Almost 55 percent of the extremely low rent units became less affordable. This may be the consequence of efforts to upgrade older, less desirable units to make them more competitive, or to respond to gentrifying activity in older neighborhoods. In viewing all of these trends, it is important to remember that the allocation process does create the appearance of more movement among affordable categories than is probably taking place.

Of the 39,712,000 rental units in 2007, 5,069,000 (or 12.8 percent) were no longer in the rental stock in 2009. More than half of these losses were due to changes in tenure, with 2,772,000 rental units becoming owner-occupied in 2009. Another 1,456,000 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 842,000 rental units were no longer in the housing stock in 2009. Some of these losses were permanent; that is, the units were demolished or destroyed. Some losses were potentially reversible, such as units being used for nonresidential purposes.

Movement into owner occupancy occurred for 7.0 percent of all rental units. The percentage of movement into owner occupancy across the categories ranged from a high of 11.2 percent for extremely high rent units to a low of 5.4 percent for low rent units. While units in the highest rent categories were more likely to become owner-occupied, there was substantial movement in this direction among extremely low rent units, with 9.4 percent becoming owner-occupied. Among 2007 rental units, 3.7 percent were seasonal or related vacant in 2009. Extremely low rent units displayed the highest rate of movement into this status (7.5 percent). Of the 2007 rental units, 2.1 percent were lost to the housing stock by 2009; this compares to a 2.4 percent loss rate for rental units between 2005 and 2007. Extremely low rent units had the highest loss rate (4.2 percent).

Backward-Looking Rental Dynamics

Table 6 tracks how the 40,391,000 rental units in the 2009 housing stock relate to the 2007 housing stock.[17] Table 7 presents the same information as Table 6, but columns B through M are now percentages of column A. Columns B through M explain where the 2009 rental units fit into the 2007 housing stock.

- If the units were also rental in 2007, they will be counted in columns B through I, depending upon how affordable they were in 2007.
- If the units were owner-occupied, they will be counted in column J.

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[17] This count differs from the 40,617,000 reported in Table 2 because it excludes units for which we have no information regarding their status in 2009.

Table 6: Backward-Looking Rental Dynamics Analysis, Counts: 2007-2009 (all numbers in thousands)

Affordability Categories	A Total in 2009	B Non-Market in 2007	C Extremely Low Rent in 2007	D Very Low Rent in 2007	E Low Rent in 2007	F Moderate Rent in 2007	G High Rent in 2007	H Very High Rent in 2007	I Extremely High Rent in 2007	J Owner Occupied in 2007	K Seasonal or Related Vacant in 2007	L New Construction	M Other Addition
Non-market	6,932	4,173	195	464	393	390	101	50	54	709	234	90	80
Extremely Low Rent	1,686	263	352	322	143	134	61	36	68	190	64	19	34
Very Low Rent	9,609	831	529	4,668	1,298	645	134	54	143	701	427	46	132
Low Rent	7,033	587	252	1,377	2,455	1,313	142	55	42	446	272	45	48
Moderate Rent	8,735	704	255	668	1,039	3,454	732	276	176	920	261	168	82
High Rent	2,980	160	115	181	115	462	818	279	100	498	121	98	32
Very High Rent	1,619	111	51	102	59	151	94	381	239	265	85	51	30
Extremely High Rent	1,797	114	91	125	43	110	41	89	719	271	83	86	25
Total	40,391	6,943	1,841	7,907	5,545	6,659	2,123	1,220	1,541	3,999	1,546	604	462

Table 7: Backward-Looking Rental Dynamics Analysis, Row Percentages: 2007-2009

Affordability Categories	A Total in 2009 (thousands)	B Non-Market in 2007	C Extremely Low Rent in 2007	D Very Low Rent in 2007	E Low Rent in 2007	F Moderate Rent in 2007	G High Rent in 2007	H Very High Rent in 2007	I Extremely High Rent in 2007	J Owner Occupied in 2007	K Seasonal or Related Vacant in 2007	L New Construction	M Other Addition
Non-market	6,932	60.2%	2.8%	6.7%	5.7%	5.6%	1.5%	0.7%	0.8%	10.2%	3.4%	1.3%	1.2%
Extremely Low Rent	1,686	15.6%	20.9%	19.1%	8.5%	7.9%	3.6%	2.2%	4.0%	11.3%	3.8%	1.2%	2.0%
Very Low Rent	9,609	8.7%	5.5%	48.6%	13.5%	6.7%	1.4%	0.6%	1.5%	7.3%	4.4%	0.5%	1.4%
Low Rent	7,033	8.4%	3.6%	19.6%	34.9%	18.7%	2.0%	0.8%	0.6%	6.3%	3.9%	0.6%	0.7%
Moderate Rent	8,735	8.1%	2.9%	7.6%	11.9%	39.5%	8.4%	3.2%	2.0%	10.5%	3.0%	1.9%	0.9%
High Rent	2,980	5.4%	3.9%	6.1%	3.9%	15.5%	27.5%	9.4%	3.4%	16.7%	4.1%	3.3%	1.1%
Very High Rent	1,619	6.8%	3.2%	6.3%	3.7%	9.3%	5.8%	23.5%	14.8%	16.3%	5.2%	3.1%	1.8%
Extremely High Rent	1,797	6.3%	5.1%	6.9%	2.4%	6.1%	2.3%	5.0%	40.0%	15.1%	4.6%	4.8%	1.4%
Total	40,391	17.2%	4.6%	19.6%	13.7%	16.5%	5.3%	3.0%	3.8%	9.9%	3.8%	1.5%	1.1%

- Seasonal units, units that were not the primary residence of their occupants, units used for migratory workers, and units that were vacant but not for rent or sale are counted in column K.
- Column L counts units that were newly constructed between 2007 and 2009.
- Column M counts units that were temporary losses to the housing stock in 2007 or were added for other reasons.

In Table 6, the sum of columns B through M equals column A, except for rounding; in Table 7, Columns B through M sum to 100 percent in each row.

The patterns in Table 7 for the backward-looking analysis are similar to those in Table 4 for the forward-looking analysis. This should not be surprising because columns B through I describe the same units in both tables; however, the units are organized differently and have different weights, and the percentages are based on different denominators. Nevertheless, there are some interesting differences. Only 35 percent of the low rent units in 2009 came from units that were low rent in 2007. There were also lower percentages of units that were in the same category both years for very low rent, moderate rent, and high rent units. Table 8 summarizes where the 2009 rental units came from by affordability category.

Table 8: Summary of Backward-Looking Rental Dynamics

Affordability Categories	2009 Rental Units (thousands)	From Less Affordable Category in 2007	In Same Affordability Category in Both Years	From More Affordable Category in 2007	2009 Rental Units Non-Rental in 2007
Non-market	6,932	23.8%	60.2%	NA	16.0%
Extremely Low Rent	1,686	45.3%	20.9%	15.6%	18.2%
Very Low Rent	9,609	23.7%	48.6%	14.2%	13.6%
Low Rent	7,033	22.1%	34.9%	31.5%	11.5%
Moderate Rent	8,735	13.5%	39.5%	30.5%	16.4%
High Rent	2,980	12.7%	27.4%	34.7%	25.1%
Very High Rent	1,619	14.8%	23.5%	35.2%	26.5%
Extremely High Rent	1,797	NA	40.0%	34.1%	25.9%
Total	40,391	19.9%	42.1%	21.6%	16.4%

Overall, slightly more rental units came from more affordable categories than from less affordable categories—21.6 percent versus 19.9 percent. Only the six middle categories can receive units from both more and less affordable categories. Extremely low rent units and very low rent units benefited more from filtering up of units from less affordable categories than from filtering down of units from more affordable categories. The remaining four categories—low rent, moderate rent, high rent, and very high rent—benefitted more from filtering down than from filtering up.

Table 5 showed net filtering up among lower rent units and net filtering down among higher rent units. Table 8 shows net filtering down among lower rent units and net filtering up among higher rent units. While the reported patterns may seem contradictory, they are not. Table 5

tracks movements *out of* affordability classes; Table 8 tracks movements *into* affordability classes.[18]

Of the 40,391,000 rental units in 2009, 6,611,000 (or 16.4 percent) were not in the rental stock in 2007. Sixty percent of these gains were due to changes in tenure, with 3,999,000 rental units having been owner-occupied in 2007. Another 1,546,000 units had been seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. New construction added 604,000 rental units. Finally, 462,000 rental units were other additions to the housing stock since 2007. These include mobile home move-ins, units created by mergers and conversions, and units that had been used for nonresidential purposes.

Movement from owner-occupancy into a rental category was the source of 9.9 percent of all rental units. The percentage of movement across the categories ranged from a high of 16.7 percent for high rent units to a low of 6.3 percent for very low rent units. Units in the three highest rent categories were more likely to have been owner-occupied, but extremely low rent and non-market units had a higher than average propensity to have been owner-occupied.

Among 2009 rental units, 3.8 percent were seasonal or related vacant in 2007. Very high rent units had the highest proportion of units that were previously seasonal or vacant (5.2 percent); the second highest proportion belonged to extremely high rent units (4.6 percent).

Of all 2009 rental units, 1.5 percent came from new construction. The three highest rent categories had substantially higher than average rates of new construction, ranging from 3.1 to 4.8 percent. Another 1.1 percent came from other additions. Extremely low rent units had 2.0 percent of their 2009 stock originate from other additions, the highest reported percentage from other additions.

Taking all outside sources into account, movement into the rental stock is greatest at the high end of the affordability spectrum. Combining columns J, K, L, and M of Table 7, 16.4 percent of 2009 rental units were not rental in 2007. The rates by category are: non-market, 16.0 percent; extremely low rent, 18.2 percent; very low rent, 13.6 percent; low rent, 11.5 percent; moderate rent, 16.4 percent; high rent, 25.1 percent; very high rent, 26.5 percent; and extremely high rent, 25.9 percent.

Rental Dynamics in Turbulent Times

In the companion CINCH report on the 2007-2009 period, we compared additions and losses to the stock during this period to earlier periods to see how the financial crisis and recession affected these flows. Table 9 performs a similar comparison for rental dynamics.

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[18] Table 5 describes what happened to units that moved out of each affordability category after 2007; Table 8 describes where the units came from that moved into each affordability category between 2007 and 2009. Table 5 sums counts in the rows of Table 3; Table 8 sums counts in the rows of Table 6. One could construct an alternative estimate of Table 5 using the counts in the columns of Table 6, as well as an alternative estimate of Table 8 using counts in the columns of Table 3. This approach produces numbers very close to those in Tables 5 and 8 for movements among affordability classes.

Table 9: Comparison of Rental Dynamics: 2003-2005, 2005-2007, and 2007-2009

Flows out of base year categories	To More Affordable Categories	In Same Affordability Category in Both Years	To Less Affordable Categories	To Non-rental including losses	To Owner-Occupancy	To Seasonal	Lost	
2003-2005 period	16.9%	50.1%	18.3%	14.7%	8.8%	4.0%	1.9%	
2005-2007 period	17.8%	41.9%	25.7%	14.6%	8.3%	3.9%	2.4%	
2007-2009 period	20.4%	44.0%	22.8%	12.8%	7.0%	3.7%	2.1%	
Flows into later year categories	**From Less Affordable Categories**	**In Same Affordability Category in Both Years**	**From More Affordable Categories**	**Non-Rental Units to Rental including additions**	**From Owner-Occupancy**	**From Seasonal**	**New Con-struction**	**Other Additions**
2003-2005 period	17.2%	49.5%	17.6%	15.7%	8.7%	3.5%	1.9%	1.6%
2005-2007 period	17.9%	41.9%	25.0%	15.2%	9.3%	3.0%	1.6%	1.3%
2007-2009 period	19.9%	42.1%	21.6%	16.4%	9.9%	3.8%	1.5%	1.1%

The CINCH comparison concluded:

> The recent financial and economic crises appear to have had little effect on overall loss rates or on types of losses. However, there was a substantial drop-off in overall additions and additions by new construction in the 2007-2009 period. As noted, additions from new construction as a percentage of the current year housing stock fell off precipitously.

The CINCH pattern, with respect to both total additions and additions through new construction, carries through to the rental dynamics analysis. Additions to the rental stock from both new construction and other additions declined from period to period. (Other additions include the merging or splitting of units and the movement of structures between the residential and commercial sectors.) New construction provided 1.9 percent of the 2005 rental stock, 1.6 percent of the 2007 rental stock, and 1.5 percent of the 2009 rental stock; other additions accounted for 1.6 percent of the 2005 rental stock, 1.3 percent of the 2007 rental stock, and 1.1 percent of the 2009 rental stock.

Gains from the owner stock and losses to the owner stock also displayed a very clear pattern. In the period before the financial crisis struck, 8.8 percent of the 2003 rental stock went to owner use in 2005, while 8.7 percent of the 2005 rental stock came from the 2003 owner stock. The actual flows were 3,360,000 rental units in 2003 to owner units in 2005 and 3,366,000 owner units in 2003 to renter units in 2005. The two flows canceled each other out. In the most recent period, 7.0 percent of the 2007 rental stock went to owner use in 2009, while 9.9 percent of the 2009 rental stock came from the 2007 owner stock. The actual flows were that 2,772,000 rental units in 2007 became owner units in 2009 and 3,999,000 owner units in 2007 became renter units in 2009, a net gain of 1,227,000 units for the 2009 rental stock.

Combining Forward-Looking and Backward-Looking Analyses

By themselves, forward-looking and backward-looking rental dynamics analyses leave an important question unanswered: Has the supply of affordable rental housing been growing or declining? Each type of analysis lacks a key piece of the puzzle. Forward-looking analysis does not produce data on the movement of units into rental housing, while backward-looking analysis does not produce data on the movement of units out of rental housing. This section combines the two types of analyses to answer this question.

The combination process is simple but potentially dangerous. One can start with the 2007 rental stock and estimate the 2009 rental stock by (1) using forward-looking analysis to track the 2007 rental stock to 2009 and then (2) adding additions to the rental stock since 2007 from the backward-looking analysis. Alternatively, one can start with the 2009 rental stock and estimate the 2007 rental stock by (1) using backward-looking analysis to project the 2009 rental stock back to 2007 and then (2) adding back in rental units that were lost to the rental stock between 2007 and 2009 from the forward-looking analysis. Table 10 performs the first of these combinations, while Table 11 performs the second.

Table 10: Tracking the Rental Stock Forward (all counts in thousands, source of estimates in parentheses)

Affordability Categories	A 2007 Rental Units (forward)	B Not Applicable	C 2007 Rental Units Non-Rental in 2009 (forward)	D In Less Affordable Categories in 2009 (forward)	E In More Affordable Categories in 2009 (forward)	F In Same Affordability Category in Both Years (forward)	G In More Affordable Category in 2007 (forward)	H In Less Affordable Category in 2007 (forward)	I 2009 Rental Units Non-rental in 2007 (backward)	J Estimated 2009 Rental Stock (combined)	K 2009 Rental Units (backward)
Non-market	8,461		1,183	2,973		4,305		1,601	1,112	7,018	6,932
Extremely Low Rent	2,262		477	1,239	184	362	279	790	307	1,738	1,686
Very Low Rent	9,309		1,177	2,546	787	4,799	1,405	2,325	1,307	9,836	9,609
Low Rent	6,290		599	1,305	1,858	2,529	2,288	1581	810	7,207	7,033
Moderate Rent	7,650		837	744	2,529	3,539	2,758	1189	1,431	8,918	8,735
High Rent	2,432		288	143	1166	834	1,066	379	749	3,029	2,980
Very High Rent	1,396		156	93	758	389	595	243	429	1,656	1,619
Extremely High Rent	1,913		352		826	735	652		466	1,853	1,797
Total	39,712		5,069	9,043	8,108	17,492	9,043	8,108	6,611	41,254	40,391

Table 11: Tracking the Rental Stock Backward (all counts in thousands, source of estimates in parentheses)

Affordability Categories	A 2007 Rental Units (forward)	B Estimated 2007 Rental Stock (combined)	C 2007 Rental Units Non-Rental in 2009 (forward)	D In Less Affordable Categories in 2009 (backward)	E In More Affordable Categories in 2009 (backward)	F In Same Affordability Category in Both Years (backward)	G In More Affordable Category in 2007 (backward)	H In Less Affordable Category in 2007 (backward)	I 2009 Rental Units Non-rental in 2007 (backward)	J Not Applicable	K 2009 Rental Units (backward)
Non-market	8,461	8,127	1,183	2,771		4,173		1,647	1,112		6,932
Extremely Low Rent	2,262	2,318	477	1,294	195	352	263	764	307		1,686
Very Low Rent	9,309	9,083	1,177	2,453	786	4,668	1,361	2,274	1,307		9,609
Low Rent	6,290	6,145	599	1257	1,834	2,455	2,216	1,552	810		7,033
Moderate Rent	7,650	7,497	837	723	2,482	3,454	2,666	1183	1,431		8,735
High Rent	2,432	2,411	288	135	1,170	818	1034	379	749		2,980
Very High Rent	1,396	1,376	156	89	750	381	570	239	429		1,619
Extremely High Rent	1,913	1,893	352		822	719	612		466		1,797
Total	39,712	38,850	5,069	8,722	8,039	17,020	8,722	8,038	6,611		40,391

The danger arises because the two analyses combine weights created for different purposes and could produce misleading answers. To illustrate the need for caution, the discussion of Tables 10 and 11 begins with two inconsistencies between the tables:

- Table 10 starts with the forward-looking estimate of the 2007 rental stock and produces an estimate of the 2009 rental stock that is 863,000 more than the estimate from the backward-looking analysis. Table 11 starts with the backward-looking estimate of the 2009 rental stock and produces an estimate of the 2007 rental stock that is 862,000 less than the forward-looking estimate.[19]

- Table 10 estimates that 17,492,000 units were in the same affordability category in both 2007 and 2009; Table 11 estimates this number as 17,020,000. These estimates are based on the same AHS sample units and differ only because the weights applied to the sample units differ.

These inconsistencies point out the need for caution in using Tables 10 and 11. This paper looks at these tables for information on the direction and magnitude of changes in affordability and for estimates of the relative magnitude of the underlying causes.

In Table 10, the estimation process runs from left to right. The calculations begin with the 2007 rental stock in 2007 (column A). The forward-looking analysis tracks movement of these units either out of the rental stock (column C) or to other affordability categories (columns D and E). Column F counts the number of units that were rental in 2007, remained rental in 2009, and were in the same affordability category in both years. Column F equals column A minus the sum of columns C, D, and E. At this point, for each affordability category, the table has taken the count of units in that category in 2007 and stripped out all the units that are not in that category in 2009. Now the table adds in units that are in the category in 2009 but did not start out in that category in 2007. Columns G and H add units that came from other affordability categories, and column I adds units that were non-rental in 2007. Column J is the estimate for 2009 of the number of units in each affordability category produced by this process. For comparison, column K contains the estimates for 2009 from the backward-looking analysis.

In Table 11, the estimation process runs from right to left. The calculations begin with the 2009 rental stock (column K). The backward-looking analysis removes units that were not rental in 2007 (column I) and units that came from other affordability categories (columns G and H). Column F counts the number of units that were rental in 2009, were also rental in 2007, and were in the same affordability category in both years. Column F is column K minus the sum of columns G, H, and I. At this point, for each affordability category, the table has taken the count of units in that category in 2009 and stripped out all the units that were not in that category in 2007. Now the table adds in units that are in the category in 2007 but did not continue in that category in 2009. Columns D and E add units that had moved out of the affordability class since 2007, and column C adds units that had moved out of the rental stock since 2007. Column B is

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[19] The difference is the same, except for rounding, in both cases because of the symmetry in the estimation procedure. The difference between columns A and K is 679,000 in both tables. The movement among affordability categories netted across all categories must be zero. Therefore, the only source of net gain or loss is the difference between columns I and C, which is 1,542,000 in both tables. 1,542,000-679,000 = 863,000.

the estimate for 2007 of the number of units in each affordability category produced by this process. For comparison, column A contains the forward-looking estimate for the 2007 rental stock.

Columns A and K are the same in both tables. This paper uses the difference between column K and column A as the CINCH estimate of change in the size of each category over the period. Table 10 estimates the change in the size of each category by subtracting column A from column J, while Table 11 estimates the change by subtracting column B from column K.

To facilitate the discussion, Table 12 collects the information from Tables 10 and 11 to explain how the rental housing stock changed from 2007 to 2009. Columns C and I are identical in both Tables 10 and 11. The difference between column I and column C is an estimate for each affordability category of the net gain between 2007 and 2009 from outside the rental stock and is reported as column E in Table 12.

Columns D, E, G, and H in Tables 10 and 11 measure movement of rental units between affordability categories. Column D measures movements from more affordable categories in 2007 to less affordable categories in 2009, while column G measures movements into less affordable categories in 2009 from more affordable categories in 2007. The sum of the movements in column D must be the same as the sum of the movements in column G in both tables.[20] Column E measures movements from less affordable in 2007 to more affordable categories in 2009, while column H measures movements into more affordable categories in 2009 from less affordable categories in 2007. Again, the sum of the movements in column E must be the same as the sum of the movements in column H in both tables.

For this reason, the sum of the totals of columns G and H minus the sum of the totals of columns D and E must equal zero in both tables. However, column G + column H – column D – column E will not equal zero for individual affordability categories. This sum is the net of all movements into and out of other affordability categories. In Table 12, column F reports this sum from Table 10, while column G reports the negative of this sum for Table 11.

The paper now examines changes in rental affordability between 2007 and 2009. To facilitate the discussion, Table 12 collects the information from Tables 10 and 11. Table 12 also contains the estimates using AHS weights from Table 1. Using Table 12, the paper discusses each affordability category separately.

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[20] Column D in Table 10 sums *horizontally* the numbers in the cells between columns C and I of Table 3 in the area above the diagonal in that section of Table 3. Column G in Table 10 sums *vertically* the numbers in the same area of Table 3. The same is true for columns D and G of Table 11 with respect to the area above the diagonal in columns C through I of Table 6.

Table 12: Changes in the Rental Stock by Affordability Category, Combined Analysis (all counts in thousands)

Rent groups	A	B	C	D	E	F	G
	AHS estimates of 2007-2009 change (Table 1)	CINCH estimate of 2007-2009 change (column K - column A)	Table 10 estimate of 2007-2009 change (column J - column A)	Table 11 estimate of 2007-2009 change (column K - column B)	Net Gain from non-rental sources (column I - column C)	Table 10 estimate of net gain from movement across categories	Table 11 estimate of net gain from movement across categories
Non-market	-1,540	-1,537	-1,443	-1,195	-71	-1,372	-1,124
Extremely Low Rent	-495	-566	-524	-632	-170	-354	-462
Very Low Rent	-1	288	527	526	130	397	396
Low Rent	541	761	917	888	211	706	677
Moderate Rent	782	1,096	1,268	1,238	594	674	644
High Rent	430	539	597	569	461	136	108
Very High Rent	150	222	260	243	273	-13	-30
Extremely High Rent	-170	-126	-60	-96	114	-174	-210
Total	-305	678	1,542	1,541	1,542	0	-1
	As percent of 2007 rental stock						
Rent groups	AHS estimates of 2007-2009 change (Table 1)	CINCH estimate of 2007-2009 change (column K - column A)	Table 10 estimate of 2007-2009 change (column J - column A)	Table 11 estimate of 2007-2009 change (column K - column B)	CINCH estimate of 2007 rental stock		
Non-market	-18.2%	-18.2%	-17.1%	-14.1%	8,461		
Extremely Low Rent	-21.9%	-25.0%	-23.2%	-27.9%	2,262		
Very Low Rent	0.0%	3.1%	5.7%	5.7%	9,309		
Low Rent	8.6%	12.1%	14.6%	14.1%	6,290		
Moderate Rent	10.2%	14.3%	16.6%	16.2%	7,650		
High Rent	17.7%	22.2%	24.5%	23.4%	2,432		
Very High Rent	10.7%	15.9%	18.6%	17.4%	1,396		
Extremely High Rent	-8.9%	-6.6%	-3.1%	-5.0%	1,913		
Total	-0.8%	1.7%	3.9%	3.9%	39,712		

- **Overall rental housing stock**
  - The rental housing stock—the combination of renter-occupied units and vacant rental units—grew between 2007 and 2009. The CINCH estimate is 678,000 in growth (1.7 percent), somewhat larger than the 499,000 estimate based on the AHS published reports. We chose these estimates over the estimate in column A, which was produced by applying AHS weights to the rental stock for which we have information in both survey years.
  - We attempt to explain the growth between 2007 and 2009 by combining both the forward-looking and backward-looking analyses. The price of combining data using different weights is a larger overall estimate, 1,542,000 more rental stock in 2009 than in 2007. At the rental stock level, movements among affordability categories cancel out and, therefore, the entire change is explained by the difference between the

CINCH estimates of rental units added between 2007 and 2009 and rental units lost between 2007 and 2009.

- **Non-market units**
  - o The number of non-market units decreased between 2007 and 2009. Estimates of the number of non-market units lost range from 1,195,000 to 1,540,000, a decline of between 14.1 and 18.2 percent of the 2007 non-market rental stock.
  - o Both the forward-looking and backward-looking analyses indicate that almost all of the loss resulted from movement of non-market units into market units.

- **Extremely low rent units**
  - o The analyses indicate a decrease in the number of extremely low rent units, ranging from 495,000 to 632,000 units, a decline of between 21.9 and 27.9 percent of the 2007 extremely low rent stock.
  - o The two CINCH analyses indicate that losses exceeded additions for this group and that more units moved out of this category than into it between 2007 and 2009. The net movement out accounted for approximately 95 percent of the loss.

- **Very low rent units**
  - o The number of very low rent units most likely increased between 2007 and 2009. The estimate, based on AHS weights, indicates no change, while the three CINCH-based estimates indicate an increase ranging from 288,000 to 527,000, an increase between 0.0 and 5.7 percent of the 2007 very low rent stock.
  - o The very low rent category benefited from both net additions and net in-movement from other categories. Net in-movement from other rent categories accounted for approximately 70 percent of the increase.

- **Low rent units**
  - o All four estimates report increases in low rent units, ranging from 541,000 to 917,000, an increase of between 8.6 and 14.6 percent of the 2007 low rent stock.
  - o The low rent category benefited from both net additions and net in-movement from other categories. Net in-movement from other rent categories accounted for approximately 75 percent of the increase.

- **Moderate rent units**
  - o All four estimates report increases in moderate rent units, ranging from 782,000 to 1,268,000, an increase of between 10.2 and 16.6 percent of the 2007 moderate rent stock.
  - o The moderate rent category benefited from both net additions and net in-movement from other categories. Net additions and net in-movement from other rent categories accounted for approximately equal amounts of the growth.

- **High rent units**
  - o All four estimates report increases in high rent units, ranging from 430,000 to 597,000, an increase of between 17.7 and 24.5 percent of the 2007 high rent stock.

- o The high rent category benefited from both net additions and net in-movement from other categories. Net additions accounted for approximately 80 percent of the growth.

- **Very high rent units**
  - o All four estimates report increases in very high rent units, ranging from 150,000 to 260,000, an increase of between 10.7 and 18.6 percent of the 2007 very high rent stock.
  - o The gain came entirely from net additions, as the analysis indicates a small net movement into other affordability categories.

- **Extremely high rent units**
  - o All four estimates report decreases in extremely high rent units, ranging from 60,000 to 170,000, a decline of between 3.1 and 8.9 percent of the 2007 extremely high rent stock.
  - o The extremely high rent category experienced a substantial gain from the excess of additions over losses, but this gain was more than offset by movement into other categories.

Conclusion

This paper began with two questions that can now be answered:

- Did the number of rental units affordable to lower income households grow or decline between 2007 and 2009?

  The two most affordable categories—non-market units and extremely low rent units— both experienced sizable declines between 2007 and 2009. Very low rent units appeared to have grown some, and there is solid evidence of growth among low rent units. The three lowest categories declined by between 1.3 and 2.0 million units, depending upon the source of the estimate. When low rent units are included in the group, the decline ranges between 0.4 to 1.5 million.

- What factors caused the number of affordable rental units to grow or decline during this period?

  Focusing only on non-market, extremely low rent, and very low rent units, net movement into and out of other affordability categories accounted for over 90 percent of the decline.

The dynamics of rental housing in the 2007-2009 period resulted from the combination of three factors:

- A major decline in additions to the rental housing stock, particularly in new construction.

- A substantial increase in the *net* flow of units from the owner stock to the renter stock.

- Large flows among affordability classes in which the most affordable and least affordable categories experienced the largest net outflows.