

RENTAL MARKET DYNAMICS

2009-2011



American Housing Survey

**Rental Market Dynamics:
2009–2011**

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Executive Summary

This report uses the American Housing Survey (AHS) to paint a precise picture of what happened to rental housing between 2009 and 2011. It focuses on the entire rental stock—occupied rental units, vacant rental units, vacant units offered for sale or rent, and units rented but not yet occupied—not just renter-occupied units. Because rental dynamics is principally concerned with affordability, the analysis classifies rental 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 median income change.

In 2009, there were 40,311,000 rental units. Of these, 11,197,000 were either extremely low rent or very low rent units. In addition, 6,845,000 units were either assisted or offered for no cash rent.

By 2011, 11.9 percent of all 2009 rental units were no longer rental: 7.1 percent had become part of the owner stock, 3.4 percent were seasonal, and 1.4 percent had been lost to the housing stock. Of the 88.1 percent that were still rental, 47.2 percent were in the same affordability category. Overall, movements up or down in the affordability spectrum were almost equal—20.7 percent became more affordable between 2009 and 2011 and 20.2 percent became less affordable. (See Tables 1 through 3.)

¹ Gross rent is rent plus utilities.

In 2011, there were 43,583,000 rental units. Of these, 11,404,000 units were extremely low rent or very low rent units. In addition, 7,645,000 units were either assisted or offered for no cash rent.

Overall, 16.7 percent of the 2011 rental stock had not been rental in 2009. Movement of units out of the owner sector accounted for 10.0 percent, and movement out of the seasonal sector accounted for another 4.6 percent. New construction added only 1.4 percent, and other additions to the stock contributed a miniscule 0.7 percent. Of the 83.3 percent that had also been rental in 2009, 44.6 percent had been in the same affordability category. Movements up or down in the affordability spectrum were almost equal—19.9 percent became more affordable and 18.7 percent became less affordable. (See Tables 4 through 6.)

Over the 2009–2011 period, the rental stock grew by almost 3.3 million units, and the three most affordable categories grew by 1.0 million units from 18.0 million to 19.0 million. As a group, the three most affordable categories represented a slightly lower share of the rental stock in 2011 (43.7 percent versus 44.8 percent) but a slightly higher percentage of the housing stock (13.9 percent versus 14.4 percent). The decline in homeownership explains why the just-cited percentages moved in opposite directions.

Table 7 shows how the growth in the three most affordable categories came about. Filtration (the net inflow of rental units from the five least affordable categories) accounted for a negligible 49,000 of the 1.0 million increase. The largest contribution came from the owner and seasonal sectors from which 695,000 units were added on net. Overall, losses exceeded new construction and other additions for a net loss of 15,000 units. The remaining 278,000 increase is attributed to a shift in the weights applied to sample units that were in one of these three categories in both years. Statistically speaking, these sample units represent more rental units in 2011 than in 2009.

Table 8 compares rental dynamics between 2009 and 2011 to the three preceding periods of 2003–2005, 2005–2007, and 2007–2009. The 2003–2005 period came before both the financial crisis and the recession, the 2005–2007 period includes the early part of the financial crisis and the end of the economic expansion, the 2007–2009 period falls squarely in both the financial crisis and the recession, and the 2009–2011 period includes the early expansion.

The rental stock grew throughout the 8 years covered by the four analyses, but the growth was uneven. When the economy was in high gear between 2003 and 2005, the rental stock grew by a modest 428,000 units. As the economy began to experience problems, the growth in the rental stock increased, culminating in a 3,272,000 units increase between 2009 and 2011. Despite slow growth between 2003 and 2005, new construction and other additions exceeded losses by the largest amount recorded in the four periods. In fact, net additions in 2003–2005 were more than double the number in 2005–2007 and 2007–2009 and almost double the number in 2009–2011. A strong economy encouraged investment in rental housing.

Flows between the rental sector and the owner and seasonal sectors are particularly interesting over this time. In the 2003–2005 period, rental stock was lost to owner and seasonal markets, but with the sharp rise in foreclosures and below-water mortgages from the financial crisis, the flow reversed. A modest net gain of 164,000 units in the 2005–2007 period was followed by large net

gains in 2007–2009 (1,317,000 units) and 2009–2011 (2,112,000 units). The homeownership rate peaked at 69.2 percent in the second quarter of 2005, falling to 65.9 by the fourth quarter of 2011. The declining trend in homeownership continued through 2014, reaching 63.9 percent in the fourth quarter of 2014.

Gentrification characterized the rental market for most of the 8-year period. With the exception of the 2009–2011 period, more base-year rental units flowed up into less affordable categories than flowed down from these categories. In the 2009–2011 period, the flow reversed with a net movement down from less affordable categories to more affordable categories.

The number of units in the three most affordable categories declined, period by period, from 2003 to 2009 and then increased between 2009 and 2011. (See Table 9.) As a percent of the rental stock, affordable rental housing became scarcer throughout the period. The biggest declines occurred between 2005 and 2009. When viewed as a percent of the housing stock, affordability declined from 2003 through 2009 and then increased from 2009 to 2011.

The recession and financial crisis sharply reduced affordable rental housing, both absolutely and as a percent of either the rental stock or the housing stock. The recovery brought about an increase in the number of affordable rental units between 2009 and 2011, but because of the corresponding shift of housing from the owner to the renter stock, this increase is not reflected in affordable housing's share of the rental stock.

Rental Market Dynamics: 2009–2011

1. Overview

Rental dynamics analysis uses microdata from the 2009 and 2011 AHSs to answer two questions:

- Did the number of rental units affordable to lower income households grow or decline between 2009 and 2011?
- What factors caused the number of affordable rental units to grow or decline during this period?

Section 2 provides background on these issues and deals with basic methodological and data concerns. Appendix A provides more details on the data sets used and the specific variables employed and discusses methodology in greater detail.

In Section 3, Tables 1 and 2 paint a precise picture, by affordability category, of what happened between 2009 and 2011 to the rental units available in 2009. This picture answers the posed questions only partially, because Tables 1 and 2 provide information on only those 2011 rental units that were also rental units in 2009; they contain no information on newly constructed rental units or units that were rental in 2011 but not rental in 2009. Tables 4 and 5 present data on new construction and the movement of units from non-rental status in 2009 to rental status in 2011. These tables furnish a precise picture, by affordability category, of where the rental units available in 2011 came from, with respect to the 2009 housing stock.

Section 4 weaves together the pictures presented in Section 3 to explain how the changes in housing affordability over this period came about.

Section 5 compares the changes to the rental stock between 2009 and 2011 to changes experienced over the three previous periods: 2003–2005, 2005–2007, and 2007–2009. The 2007–2009 period covers most of the financial crisis and the recent recession, while the 2009–2011 period encompasses the earlier recovery.

Section 6 answers the two questions posed above in the context of broader time period.

Econometrica, Inc., completed this report in two stages. Rental dynamics reports normally present both forward-looking analysis (what happened to the 2009 rental units by 2011) and backward-looking analysis (where the 2011 rental units came from in terms of 2009). The initial 2011 public use file (PUF) available for analysis contained incomplete and inaccurate information on additions to the stock between 2009 and 2011, making it impossible to perform the backward-looking analysis.² The forward-looking analysis was presented to HUD in December 2013; the backward-looking analysis was added in 2015.

² HUD released a new version of the 2011 PUF on November 19, 2013, 7 weeks after the allowed period of performance for the contracted work.

2. 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, 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: 2009–2011* (Eggers 2015), undertook a CINCH analysis using the 2009 and 2011 AHSs.³

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

³ *Components of Inventory Change: 2009–2011*, Frederick J. Eggers and Fouad Moumen. A report prepared for the Department of Housing and Urban Development by Econometrica, February 2015. This report is available at <http://www.huduser.org/portal/datasets/cinch/cinch11/cinch09-11.pdf>.

⁴ Gross rent is rent plus utilities. If local median income were 48,000 a year, then—on a monthly basis—50 percent of median income would be \$2,000 and 30 percent would be \$1,200. The upper boundaries of the extremely low income and very low income categories would be \$360 (0.30*\$1,200) and \$600 (0.30*\$2,000). A unit costing \$450 per month with tenant-paid utilities of \$90 per month would have a gross rent of \$540. This unit would be too expensive for the extremely low rent category but would qualify for the very low rent category.

2009 and 2011, then the upper boundaries of each category will also increase between 2009 and 2011.⁵

3. Rental Dynamics Tables

Table 1 tracks how 40,311,000 rental units in the 2009 housing stock relate to the 2011 housing stock. Of the 2009 rental units, 11,197,000 were extremely low rent or very low rent units. In addition, 6,845,000 units were either assisted or offered for no cash rent. These three categories accounted for 44.8 percent of the 2009 housing stock.

Columns B through L explain where the 2009 rental units fit into the 2011 housing stock.

- If the units are still rental in 2011, they will be counted in columns B through I, depending on how affordable they are in 2011.
- 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 2009 units that are not in the 2011 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 2 presents the same information as Table 1, but columns B through L are now percentages of column A. Columns B through L sum to 100 percent in each row.

Over 60 percent of the 2009 non-market units are non-market in 2011 as well. In this case, one might have expected even greater consistency between surveys, because non-market units consist of assisted housing and units that are not rented for cash. Public housing units and units in projects that receive assistance should remain assisted in 2011 unless they have left the stock. (Approximately 3 percent of the non-market units were not in the stock in 2011.) 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.

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 40 to 50 percent of the 2009 units in these categories staying in the same category in 2011. Units that had extremely low rents in 2009 displayed the highest propensity to change status between surveys; only 22 percent of these units were extremely low rent in 2011. The small extremely low rent category may be sensitive to changes in boundaries caused by changes in local median income.

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 2009 and \$640 in 2011, while the upper boundary of the low-income category changes from \$600 to \$650 between 2009 and 2011, then the unit that was classified as moderate income in 2009 will be classified as low income in 2011 despite higher rental costs.

Table 1: Forward-Looking Rental Dynamics Analysis, Counts: 2009–2011 (All Numbers in Thousands)

Affordability Categories	A Total in 2009	B Non-Market in 2011	C Extremely Low Rent in 2011	D Very Low Rent in 2011	E Low Rent in 2011	F Moderate Rent in 2011	G High Rent in 2011	H Very High Rent in 2011	I Extremely High Rent in 2011	J Owner Occupied in 2011	K Seasonal or Related Vacant in 2011	L Lost to Stock in 2011
Non-Market	6,845	4,314	146	513	361	408	75	57	51	619	215	86
Extremely Low Rent	1,694	211	381	334	148	159	73	39	50	173	72	55
Very Low Rent	9,503	646	386	4,790	1,541	645	164	78	153	563	325	213
Low Rent	7,048	378	154	1,306	2,858	1,415	195	56	54	355	212	64
Moderate Rent	8,709	405	218	671	1,291	4,199	667	221	122	552	275	87
High Rent	2,996	116	73	136	129	689	1,157	184	64	274	149	26
Very High Rent	1,648	71	40	93	55	283	261	439	179	150	60	17
Extremely High Rent	1,868	67	70	113	66	116	44	244	878	173	80	16
Total	40,311	6,209	1,468	7,956	6,449	7,913	2,636	1,318	1,551	2,859	1,389	563

Table 2: Forward-Looking Rental Dynamics Analysis, Row Percentages: 2009–2011

Affordability Categories	A Total in 2009 (Thousands)	B Non-Market in 2011	C Extremely Low Rent in 2011	D Very Low Rent in 2011	E Low Rent in 2011	F Moderate Rent in 2011	G High Rent in 2011	H Very High Rent in 2011	I Extremely High Rent in 2011	J Owner Occupied in 2011	K Seasonal or Related Vacant in 2011	L Lost to Stock in 2011
Non-Market	6,845	63.0%	2.1%	7.5%	5.3%	6.0%	1.1%	0.8%	0.7%	9.0%	3.1%	1.3%
Extremely Low Rent	1,694	12.5%	22.5%	19.7%	8.7%	9.4%	4.3%	2.3%	2.9%	10.2%	4.2%	3.2%
Very Low Rent	9,503	6.8%	4.1%	50.4%	16.2%	6.8%	1.7%	0.8%	1.6%	5.9%	3.4%	2.2%
Low Rent	7,048	5.4%	2.2%	18.5%	40.5%	20.1%	2.8%	0.8%	0.8%	5.0%	3.0%	0.9%
Moderate Rent	8,709	4.7%	2.5%	7.7%	14.8%	48.2%	7.7%	2.5%	1.4%	6.3%	3.2%	1.0%
High Rent	2,996	3.9%	2.4%	4.5%	4.3%	23.0%	38.6%	6.1%	2.1%	9.1%	5.0%	0.9%
Very High Rent	1,648	4.3%	2.4%	5.7%	3.4%	17.2%	15.8%	26.6%	10.9%	9.1%	3.7%	1.0%
Extremely High Rent	1,868	3.6%	3.7%	6.1%	3.5%	6.2%	2.4%	13.1%	47.0%	9.3%	4.3%	0.9%
Total	40,311	15.4%	3.6%	19.7%	16.0%	19.6%	6.5%	3.3%	3.8%	7.1%	3.4%	1.4%

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 property taxes resulting from changes in property values or changes in tax rates, and changes in the demand for rental units. Growth in median household income, by itself, 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 the 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 numbers in Tables 1 and 2 suggest that some rental units move far from their initial category. For example, 6.1 percent of the units that were extremely high rent in 2009 became very low rent in 2011. 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.⁶

Table 3 summarizes what happened to the 2009 rental units by affordability category.

Table 3: Summary of Forward-Looking Rental Dynamics

Affordability Categories	A 2009 Rental Units (Thousands)	B To More Affordable Categories in 2011	C In Same Affordability Category in Both Years	D To Less Affordable Categories in 2011	E 2009 Rental Units Non-Rental in 2011
Non-Market	6,845	NA	63.0%	23.5%	13.4%
Extremely Low Rent	1,694	12.5%	22.5%	47.3%	17.7%
Very Low Rent	9,503	10.9%	50.4%	27.2%	11.6%
Low Rent	7,048	26.1%	40.5%	24.4%	9.0%
Moderate Rent	8,709	29.7%	48.2%	11.6%	10.5%
High Rent	2,996	38.1%	38.6%	8.3%	15.0%
Very High Rent	1,648	48.8%	26.6%	10.9%	13.7%
Extremely High Rent	1,868	38.6%	47.0%	NA	14.4%
Total	40,311	20.7%	47.2%	20.2%	11.9%

Overall, movements up or down in the affordability spectrum were almost equal—20.7 percent versus 20.2 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 moderate, high rent, and very

⁶ 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>.

high rent 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 50 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. Or, as noted, this category may be sensitive to boundary changes. 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 40,311,000 rental units in 2009, 4,811,000 (or 11.9 percent) were no longer in the rental stock in 2011. Almost 60 percent of these losses were due to changes in tenure, with 2,859,000 rental units becoming owner occupied in 2011. Another 1,389,000 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 563,000 rental units were no longer in the housing stock in 2011. 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 7.1 percent of all rental units. The percentage of movement into owner occupancy across the categories ranged from a high of 10.2 percent for extremely low rent units to a low of 5.0 percent for low rent units. With the exception of the extremely low rent units, units in the highest rent categories were more likely to become owner occupied. Among 2009 rental units, 3.4 percent were seasonal in 2011. High rent units displayed the highest rate of movement into this status (5.0 percent). Of the 2009 rental units, 1.4 percent were lost to the housing stock by 2011. Extremely low rent units had the highest loss rate (3.2 percent).

Table 4 shows the source, by affordability category, of the 43,580,000 rental units in the 2011 housing stock. In 2011, 11,404,000 units were extremely low rent or very low rent units. In addition, 7,645,000 units were either assisted or offered for no cash rent. Comparing Tables 1 and 4, we see that the rental stock grew by almost 3.3 million units and that the three most affordable categories grew by 1.0 million units. As a group, the three most affordable categories represented a slightly lower share of the rental stock in 2011 (43.7 percent versus 44.8 percent).

Table 5 presents the same information as Table 1, but columns B through M are now percentages of column A.

Columns B through M explain where the 2011 rental units came from:

- If the units were rental in 2009, they will be counted in columns B through I, depending on how affordable they were in 2009.
- If the units were owner occupied, they will be counted in column J.
- Seasonal units, units that were not the primary residence of their occupants, units used for migratory workers, and units that wear vacant but not for rent or sale are counted in column K.

Table 4: Backward-Looking Rental Dynamics Analysis, Counts: 2009–2011 (All Numbers in Thousands)

Affordability Categories	A Total in 2011	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 New Construction	M Added in Other Ways
Non-Market	7,645	4,403	219	684	407	433	126	76	71	837	222	117	51
Extremely Low Rent	1,901	143	390	386	151	218	73	39	71	216	161	17	35
Very Low Rent	9,503	505	341	4,927	1,347	693	139	95	112	725	502	47	71
Low Rent	7,653	354	146	1,574	2,932	1,349	137	58	69	607	313	62	52
Moderate Rent	9,649	397	161	650	1,448	4,304	725	286	121	985	402	115	57
High Rent	3,450	75	73	163	185	676	1,185	274	46	474	185	96	17
Very High Rent	1,718	55	39	76	54	217	187	442	257	270	72	35	15
Extremely High Rent	2,064	47	50	148	54	114	63	176	877	229	161	130	16
Total	43,580	5,978	1,419	8,608	6,579	8,004	2,634	1,444	1,623	4,343	2,017	620	313

Table 5: Backward-Looking Rental Dynamics Analysis, Row Percentages: 2009–2011

Affordability Categories	A Total in 2011	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 New Construction	M Added in Other Ways
Non-Market	7,645	57.6%	2.9%	9.0%	5.3%	5.7%	1.7%	1.0%	0.9%	10.9%	2.9%	1.5%	0.7%
Extremely Low Rent	1,901	7.5%	20.5%	20.3%	8.0%	11.5%	3.9%	2.0%	3.7%	11.4%	8.5%	0.9%	1.8%
Very Low Rent	9,503	5.3%	3.6%	51.8%	14.2%	7.3%	1.5%	1.0%	1.2%	7.6%	5.3%	0.5%	0.7%
Low Rent	7,653	4.6%	1.9%	20.6%	38.3%	17.6%	1.8%	0.8%	0.9%	7.9%	4.1%	0.8%	0.7%
Moderate Rent	9,649	4.1%	1.7%	6.7%	15.0%	44.6%	7.5%	3.0%	1.3%	10.2%	4.2%	1.2%	0.6%
High Rent	3,450	2.2%	2.1%	4.7%	5.4%	19.6%	34.3%	7.9%	1.3%	13.8%	5.4%	2.8%	0.5%
Very High Rent	1,718	3.2%	2.3%	4.4%	3.1%	12.6%	10.9%	25.7%	15.0%	15.7%	4.2%	2.1%	0.9%
Extremely High Rent	2,064	2.3%	2.4%	7.2%	2.6%	5.5%	3.1%	8.5%	42.5%	11.1%	7.8%	6.3%	0.8%
Total	43,580	13.7%	3.3%	19.8%	15.1%	18.4%	6.0%	3.3%	3.7%	10.0%	4.6%	1.4%	0.7%

- Column L counts newly constructed rental units.
- Column M counts rental units that were not in the stock in 2009 but were added to the 2011 stock by means other than new construction.

The sum of columns B through M equals column A, except for rounding. In Table 5, Columns B through M sum to 100 percent in each row.

Table 6 summarizes where 2011 rental units came from, by affordability category.

Table 6: Summary of Backward-Looking Rental Dynamics

Affordability Categories	A 2011 Rental Units in Thousands	B From More Affordable Categories in 2009	C In Same Affordability Category in Both Years	D From Less Affordable Categories in 2009	E 2009 Rental Units Non-Rental in 2009
Non-Market	7,645	NA	57.6%	26.4%	16.0%
Extremely Low Rent	1,901	7.5%	20.5%	49.3%	22.6%
Very Low Rent	9,503	8.9%	51.8%	25.1%	14.2%
Low Rent	7,653	27.1%	38.3%	21.1%	13.5%
Moderate Rent	9,649	27.5%	44.6%	11.7%	16.1%
High Rent	3,450	34.0%	34.3%	9.3%	22.4%
Very High Rent	1,718	36.5%	25.7%	15.0%	22.8%
Extremely High Rent	2,064	31.6%	42.5%	NA	25.9%
Total	43,583	18.7%	44.6%	19.9%	16.7%

Only 44.6 percent of the 2011 rental units were rental in 2009 and in the same affordability status in 2009, 19.9 percent were rental and less affordable in 2009, and 18.7 percent were rental and more affordable in 2009. Approximately one out of every six rental units in 2011 were not part of the 2009 rental stock. The bottom row of Table 5 shows that 10 percent were owner occupied or vacant for sale in 2009, and 4.6 percent were seasonal or seasonally vacant in 2009. Only 1.4 percent were newly constructed, and only 0.7 percent were added to the housing stock by other means.

The proportion of 2011 rental units that were not part of the 2009 rental stock varies across affordability categories, with the least affordable categories generally having the largest proportions of new rental units. The largest source of “new” rental units was the owner sector. Overall, 10.0 percent of 2011 rental units were owner units in 2009. The very high rent and high rent categories had the highest percentage of units from the owner sector; the extremely low rent category had the third highest percentage. An interesting finding is that roughly 1 out of 20 rental units in 2011 had been in the seasonal sector in 2009. The extremely low rent and extremely high rent categories were most impacted by these flows. New construction and other additions accounted for only 2.1 percent of 2011 rental units. The extremely high rent category had the highest percentage of newly constructed units (7.8 percent), and the extremely low rent category had the highest percentage of new units added by other means (1.8 percent).

Table 6 shows evidence of both filtration and gentrification, with slightly more movement down (19.9 percent) than up (18.7 percent) the affordability scale. As expected, the more affordable categories gained from filtration, and the less affordable categories gained from gentrification. In only two categories did more than half of the 2011 units come from the same category in 2009: 57.6 percent of the non-market units were non-market in 2009, and 51.8 percent of the very low rent units were very low rent in 2009.

4. Evolution of the Rental Housing Market from 2009 to 2011

Table 7 combines the information from Tables 1 and 4 to explain how the rental stock evolved from 2009 to 2011.⁷ Appendix B explains how Table 7 was constructed.

Net additions (column B) added 370,000 units to the overall rental stock, but losses to the stock exceeded additions in the two lowest market rent categories (extremely low rent and very low rent housing units). Every affordability category gained more units from the owner and seasonal stocks than were lost to these sectors (column C). On net, more than 2.1 million units were added as units that had previously been owner occupied or seasonal became part of the rental stock. The homeownership fell from 67.5 percent in the fourth quarter of 2008 to 65.9 percent in the fourth quarter of 2011.⁸

Columns D and E record, respectively, the interaction between a particular category and less affordable categories and between a particular category and more affordable categories. Column D records the net flow from and into less affordable categories. This inflow is zero for the extremely high rent category because there are no categories that are less affordable. A positive number in column D means that more units filtered down from less affordable categories than gentrified up into those categories. Column E records the net flow from and into more affordable categories. This inflow is zero for the non-market category because there are no categories that are more affordable. A positive number in column E means that more units gentrified up from more affordable categories than filtered down into those categories.

Column F is a statistical adjustment. The same sample units are used to estimate the segment of the rental stock that are in a particular affordability category in both 2009 and 2011 but the weights used to produce the 2011 estimate are different than the weights used to produce the 2009 estimate. Column F measures the impact of changing the weights.

Table 7 explains changes to the rental stock at each affordability level:

- **Non-Market Rental Units:** Non-market rental units include subsidized units and units rented for no cash rent (e.g., units rented to building managers or tenant farmers). The number of non-market rental units grew from 6.8 million in 2009 to 7.6 million in 2011.

⁷ In previous rental dynamics studies, we combined the forward-looking and backward-looking analyses to produce estimates of both the previous survey year and the most recent survey year rental stock. Table 7 combines these analyses to produce a consistent and more coherent portrayal of how the rental market evolved.

⁸ Table 14a. Seasonally Adjusted Homeownership Rates for the United States: 1980 to Present found at <http://www.census.gov/housing/hvs/data/histtabs.html>.

Table 7: Evolution of the Rental Housing Market, 2009 to 2011 (Counts in Thousands)

Affordability Categories	A 2009 Rental Units	B Net Additions	C Net Non-Rental In	D Net Inflow From Less Affordable Category	E Net Inflow From More Affordable Category	F Impact of Different Weights	G 2011 Rental Stock
Non-market	6,845	82	224	404	0	90	7,645
Extremely Low Rent	1,694	-2	133	136	-68	9	1,901
Very Low Rent	9,503	-95	339	-196	-185	137	9,503
Low Rent	7,048	50	352	-107	235	75	7,653
Moderate Rent	8,709	85	559	121	71	105	9,649
High Rent	2,996	87	237	72	30	28	3,450
Very High Rent	1,648	34	132	78	-177	3	1,718
Extremely High Rent	1,868	129	137	0	-69	-1	2,064
Total	40,311	370	2,112	509	-163	445	43,583
Non-Market, Extremely Low Rent, and Very Low Rent	18,042	-15	695	49	0	278	19,049

The magnitude of this increase is puzzling, as there was no corresponding increase in the number of subsidized housing units. More than half (404,000) of the explained increase came from the transformation of market-rate rental units into non-market units. The net inflow from the owner and seasonal sectors was 224,000. Net additions added 82,000 units. The shift between 2009 and 2011 in the weights applied to units that were non-market in both years explains 90,000 of this increase.

- **Extremely Low Rent Units:** The number of extremely low rent units grew from 1.7 million in 2009 to 1.9 million in 2011. This category both gained and lost through the filtration of rental units. Net inflows from less affordable contributed 136,000 units, whereas, on net, 68,000 units flowed out to the more affordable categories; summed, these inter-category movements added 68,000 units. Movements into and out of the owner and seasonal housing sectors added 133,000 units. On net 2,000 units were lost to the stock, and the shift in weights explains 9,000 units of the growth.
- **Very Low Rent Units:** The number of very low rent units remained unchanged at 9.5 million over the period, but “no change” resulted from large offsetting flows. Gentrification and filtration combined to reduce this category by 381,000 units—gentrification in terms of a net outflow of 196,000 units to less affordability categories, and filtration in terms of a net outflow of 185,000 to more affordable categories. This loss was mostly offset by a 339,000-unit inflow from the owner and seasonal sectors. Losses exceeded additions to the stock for this category for a net loss of 95,000 units. The shift in weights caused the 2011 count to be 137,000 units higher.
- **Low Rent Units:** The number of low rent units grew from 7.0 million in 2009 to 7.7 million in 2011. On net filtration benefited this category by 128,000 units, as 235,000 units on net flowed in from less affordable categories and 107,000 units on net flowed out to more affordable categories. Additions exceeded losses by 50,000, and 352,000 units on net flowed in from the owner and seasonal sectors. The shift in weights caused the 2011 count to be 75,000 units higher.

Between 2009 and 2011, the number of units in the three most affordable categories—non-market, extremely low rent, and very low rent—grew from 18.0 million to 19.0 million.⁹ Net inflows of rental units from the five least affordable categories accounted for a negligible 49,000 of this 1.0 million increase. The largest contribution came from the owner and seasonal sectors, from which 695,000 units were added. Overall, losses exceeded additions for a net loss of 15,000. The shift in weights used to estimate the number of units that were in one of these three categories in both years caused the 2011 count to be 278,000 units higher. Statistically speaking, these sample units represent more rental units in 2011 than in 2009.

- **Moderate Rent Units:** Moderate rent units experienced the largest growth—950,000 units—from 8.7 million in 2009 to 9.65 million in 2011. This category benefited from both net inflows from less affordable categories (121,000 units) and inflows from more affordable categories (71,000). The largest contribution came from the owner and

⁹ We did not analyze the two most affordable market categories by themselves due to the puzzling 404,000 inflow into the non-market category from units in less affordable categories. Of the 404,000 net inflow, 296,000 came from the extremely low rent and very low rent categories.

seasonal sectors, with a net inflow of 559,000. Additions exceeded losses by 85,000. The shift in weights caused the 2011 count to be 105,000 units higher.

- **High Rent Units:** The number of high rent units grew from 3.0 million to 3.45 million. This category benefited from both net inflows from less affordable categories (72,000 units) and inflows from more affordable categories (30,000). The owner and seasonal sectors contributed a net inflow of 237,000. Net additions were 87,000. The shift in weights caused the 2011 count to be 28,000 units higher.
- **Very High Rent Units:** Very high rent units form a small segment of the rental stock—approximately 4 percent. The number of these units grew from 1.65 million in 2009 to 1.72 million in 2012. There was a modest inflow of 78,000 from the only less affordable category, extremely high rent units, but an outflow of 177,000 units to more affordable categories. The owner and seasonal sectors contributed a net inflow of 132,000. Net additions were 87,000. The shift in weights caused the 2011 count to be 3,000 units higher.
- **Extremely High Rent Units:** Extremely high rent units also form a small segment of the rental stock—slightly more than 4.5 percent. The number of these units grew from 1.9 million in 2009 to 2.1 million in 2012. There was a modest outflow of 69,000 units to more affordable categories. The owner and seasonal sectors contributed a net inflow of 137,000. Net additions were 129,000 units, the largest contribution from this source among all the categories. The shift in weights caused the 2011 count to be 1,000 units lower.

5. Changes in the Rental Stock, 2003–2011

The economy in general and the housing market in particular have experienced turbulence over the last several years. The financial crisis strongly affected the 2007–2009 period. Troubles with subprime and nontraditional mortgage products began as early as 2006 and grew in volume and spread to other financial markets. The first of several crescendos broke on July 31, 2007, when two of Bear Stearns’s hedge funds filed for bankruptcy. A severe recession followed shortly afterward. The official dating of the business cycle by the National Bureau of Economic Research places the peak of the previous expansion at December 2007 and the trough of the recession at June 2009.

In the companion CINCH report on the 2009–2011 period, we compared changes to the stock during this period to earlier periods to see how the financial crisis and recession affected these flows. Table 8 performs a similar comparison for rental dynamics, using the same format used in Table 7.

Seen through the perspective of the recession and financial crisis, Table 8 reveals some fascinating trends in the rental housing market:

- The rental stock grew throughout the 8 years covered by the four analyses, but the growth was uneven. When the economy was in high gear between 2003 and 2005, the rental stock grew by a modest 428,000. As the economy began to experience problems, the

growth in the rental stock increased. During the financial crisis, 1,312,000 units were added. After the trough, growth slowed to 678,000 units between 2007 and 2009 but accelerated in the 2009–2011 period to 3,272,000 units.

Table 8: Comparison of Rental Dynamics: 2003–2005, 2005–2007, 2007–2009, and 2009–2011¹⁰

	2003–2005	2005–2007	2007–2009	2009–2011
Base Year Rental Units	38,171	38,444	39,712	40,311
Net Additions – Losses	621	265	225	370
Net Non-Rental In	-145	164	1,317	2,112
Net Inflow From Less Affordable Category	-350	-2,747	-1,005	509
Net Inflow From More Affordable Category	322	3,083	614	-163
Impact of Different Weights	-19	547	-472	445
Final Year Rental Units	38,599	39,756	40,391	43,583
Change in Rental Stock	428	1,312	678	3,272

- Despite the slow growth between 2003 and 2005, new construction and other additions exceeded losses by the largest amount recorded in the four periods. In fact, net additions in the 2003–2005 period were more than double the number in 2005–2007 and 2007–2009 and almost double the number in 2009–2011. A strong economy encouraged investment in rental housing.
- Flows between the rental sector and the owner and seasonal sectors are particularly interesting. In the 2003–2005 period, rental stock was lost to owner and seasonal markets, but with the sharp rise in foreclosures and below-water mortgages from the financial crisis, the flow reversed. A modest net gain of 164,000 in the 2005–2007 period was followed by large gains in 2007–2009 (1,317,000) and 2009–2011 (2,112,000). The homeownership rate peaked at 69.2 percent in the second quarter of 2005, falling to 65.9 by the fourth quarter of 2011. The declining trend in homeownership continued through 2014, reaching 63.9 percent in the fourth quarter of 2014.¹¹
- Gentrification characterized the rental market for most of the 8-year period. With the exception of the 2009–2011 period, more base-year rental units flowed up into less affordable categories than flowed down from these categories. Again with the exception of the 2009–2011 period, more units flowed up from more affordable categories than flowed down into these categories. In the 2009–2011 period, the flow reversed with a general movement on net of units into categories from less affordable categories and out of categories into more affordable categories.
- The “Impact of Different Weights” row results from constructing weights to match published totals in two different periods. Except for the 2003–2005 period when this

¹⁰ The base-year and final-year numbers for the same years show some minor variation. For example, the 2003–2005 analysis shows 38,599,000 units in the rental stock at the end of the period, while the 2005–2007 analysis shows 38,444,000 units at the beginning of the period. Weights for the CINCH and rental dynamics analyses are created for each 2-year period. The 38,599,000 number is derived from weights for the 2003–2005 period, while the 38,444,000 number is derived from weights for the 2005–2007 period. Weights are controlled to published counts of occupied units, vacant units, and seasonal units in each year but not to published counts of rental units.

¹¹ Op. cit.

adjustment is minimal, the adjustment represents 9 to 15 percent of the absolute size of the measured flows in the other four rows.

The flows reported in Table 8 are consistent with the following depiction of the housing market over the 2003–2011 period. In the heyday of the housing price bubble, rental units were converted into owner-occupied units and the declining rental stock and strong economy drove up rents, inducing gentrification and encouraging investment in rental properties. With the financial crisis, residential property values fell and many homeowners found themselves with mortgages that were substantially underwater. Lenders were overwhelmed with non-performing mortgages, and the normal foreclosure process was delayed by the sheer volume of the defaults and by the limited prospects for selling properties once possession was obtained. Over the next 6 years, properties moved in an accelerated fashion from the owner market to the rental market as foreclosures proceeded and underwater borrowers sold their homes. Despite historically low interest rates, many of these units became rental properties because overly restrictive revisions to underwriting standards made mortgage borrowing difficult and the dramatic volatility in housing prices made homeownership less attractive. The weak economy discouraged production of new rental units in the 2005–2007 period, and the slow adjustment to the mortgage crisis created upward pressures on rents during this period. As higher-income families switched to being renters rather than homeowners and median income stagnated or declined in the 2007–2009 period, the upward shift in affordability among rental units continued. This upward flow among existing rental units was reversed in the 2009–2011 period as more units moved from the owner to the rental stock and the production of new rental units increased, adding to the supply of rental units at all affordability levels.

Table 9 tracks the change in the affordable rental stock over the 8-year period. It classifies affordable rental housing as consisting of extremely low rent units plus very low rent units, either by themselves or including non-market units.

Table 9: Affordable Rental Housing, 2003–2011¹²

Affordable Rental Units (Counts in Thousands)	2003	2005	2007	2009	2011
Non-market, extremely low rent, and very low rent	22,128	21,631	20,032	18,042	19,049
Extremely low rent and very low rent	13,909	13,025	11,571	11,197	11,404
As Percent of Rental Stock	2003	2005	2007	2009	2011
Non-market, extremely low rent, and very low rent	58.0%	56.5%	50.4%	44.8%	43.7%
Extremely low rent and very low rent	36.4%	34.0%	29.1%	27.8%	26.2%
As Percent of Housing Stock	2003	2005	2007	2009	2011
Non-market, extremely low rent, and very low rent	18.3%	17.4%	15.6%	13.9%	14.4%
Extremely low rent and very low rent	11.5%	10.5%	9.0%	8.6%	8.6%

The number of affordable rental units, including or not including non-market units, declined from 2003 to 2009 and then increased between 2009 and 2011. As a percent of the rental stock, affordable rental housing became scarcer throughout the period. The biggest declines occurred

¹² For 2005, 2007, and 2009, the counts are based on the 2005–2007, 2007–2009, and 2009–2011 rental dynamics analyses, respectively.

between 2005 and 2009. When viewed as a percent of the housing stock, affordability measured as non-market units, extremely low rent units, and very low rent units declined from 2003 through 2009 and then increased from 2009 to 2011. Affordability measured as extremely low rent units and very low rent units declined from 2003 through 2009 and then stabilized from 2009 to 2011.

The recession and financial crisis sharply reduced affordable rental housing, both absolutely and as a percent of either the rental stock or the housing stock. The recovery brought about an increase in the number of affordable rental units between 2009 and 2011, but because of the corresponding decrease in homeownership, this increase is not reflected in affordable housing's share of the rental stock.

6. Conclusions

Two questions were posed at the beginning of this report; the preceding analysis answers those questions and puts the answers into a broader historical perspective.

- *Did the number of rental units affordable to lower-income households grow or decline between 2009 and 2011?*

The number of non-market, extremely low rent, and very low rent units increased from 18.0 million in 2009 to 19.0 million in 2011. This increase contrasts with the declines reported in the three previous rental dynamics studies covering the 2003–2005, 2005–2007, and 2007–2009 periods. The percentage of rental units that fit into these three categories continued to fall during the 2009–2011 period because the rental sector grew substantially as the homeownership rate fell. However, the 1 million-unit increase reversed a decline in affordable rental housing as measured as a percentage of the entire housing stock.

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

Net inflows of rental units from the five least affordable categories (filtration) accounted for a negligible 49,000 of this 1 million increase. The largest contribution came from the owner and seasonal sectors, from which on net 695,000 units were added. Overall, losses exceeded new construction and other additions for a net loss of 15,000 units to these categories. The shift in weights used to estimate the number of units that were in one of these three categories in both years caused the 2011 count to be 278,000 units higher.

While filtration and net additions were not important contributors to the three affordable categories, the 2009–2011 period saw some important changes in how these factors affect the overall rental stock. Net additions accounted for 370,000 rent units in 2011, up substantially from the 2005–2007 and 2007–2009 periods. Gentrification characterized the rental market for most of the 8-year period. In the 2009–2011 period, the flow reversed with a net movement of units downward into more affordable categories.

Appendix A: Data Sets and Variables Used

The AHS provided the data used in this analysis and is well suited for this purpose, as 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)¹³
- 2009-2011 CINCH variables and weights.¹⁴

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.¹⁵ 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.^{16,17}

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 2009 and 2011, 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.¹⁸ 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 2009 to 2011 those units that were part of the 2009 housing stock and (2) a set of backward-looking CINCH weights (BLCINCHWT) that allow one to track from

¹³ 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>.

¹⁴ The data set and documentation are available at <http://www.huduser.org/datasets/cinch.html>.

¹⁵ With the exception of abbreviations such as AHS, CINCH, and HADS, words in this Appendix printed with all capital letters are the names of variables in different data sets.

¹⁶ 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.

¹⁷ 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.

¹⁸ 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.

2011 to 2009 those units that were part of the 2009 housing stock. This paper uses these weights for the rental dynamics analysis.

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 2009 housing unit was also in the 2011 housing stock or whether it had been lost to the stock for one of six reasons, while BLSTATUS indicates whether a 2011 housing unit was also in the 2011 housing stock or whether it had been added to the stock by one of six means. The CINCH data set includes four additional variables that were constructed from OWNRENT and COSTMEDRELAMICAT in HADS. Two variables (FLRENT and FLAFFORD) classify rental units in 2009 and 2011, respectively, into one of the eight categories used in this paper. Two variables (BLRENT and BLAFFORD) classify rental units in 2011 and 2009, respectively, into one of the eight categories used in this paper.

Appendix B: Reconciling the Forward-Looking and Backward-Looking Analyses

Table 7 reconciles the forward-looking and backward-looking analyses. It tracks how each rental affordability category evolved between 2009 and 2011, breaking the observed change down into various inflows and outflows plus an adjustment for the change in weights. This Appendix explains the derivation of Table 7, using the Moderate Rent Affordability category as an example.

Table B-1 has two panels. The left panel uses the numbers in Table 1 to describe what happened to the rental units in 2009 with moderate rents; the right panel uses the numbers in Table 4 to explain where 2011 rental units with moderate rents came from. In addition to the weighted counts from the earlier tables, Table B-1 also counts the number of sample units on which the estimates are based.

There are three important facts about Table B-1:

- Both the sample counts and the weighted numbers are consistent within each panel—that is, $A = B+C+D+E+F+G$ and $H=I+J+K+L+M+N+O$.
- The weights used in each panel are appropriate to the task of that panel. Each of the weighted numbers is a statistically sound estimate of its segment of the housing market. For example, in row C, 191,000 is a statistically valid estimate of the number of 2009 rental units with moderate rents that had become part of the owner stock by 2011.
- The estimates in each panel are conceptually appropriate for the task of that panel. B, C, D, E, F, and G tell what happened to A by 2011, while I, J, K, L, M, N, and O are the pieces that form H in 2011.

Table B-1 raises an obvious question: rows G and O purport to be the same segment—rental units that have moderate rents in both 2009 and 2011—so why do the weighted counts differ? Not only are the sample counts identical for rows G and O, but the sample units are identical. Every AHS unit that is in G is also in O and vice versa. The counts differ because different weights are applied to the same units, and different weights are used because the left and right panels tell different stories. In the context of the left panel, row G estimates how many 2009 moderate rent units will remain moderate rent in 2011. The row G estimate is based on the 2009 housing stock. In the context of the right panel, row O estimate how many 2011 moderate rent units were moderate rent in 2009. The row O estimate is based on the 2011 housing stock.

Understanding the difference between rows G and O allows us to construct a consistent description of how the rental stock evolved between 2009 and 2011. Table B-2 combines the left and right panels of Table B-1 to trace how the moderate rent category changed between 2009 and 2011. Table B-2 contains a new row, O-G, that measures the effect from using new weights when the perspective changes from 2009 to 2011. The bottom three rows demonstrate how the information in Table B-1 allows us to tell a consistent story of how the moderate rent category changed. (The 1,000 difference in weighted counts between row H and the bottom row is due to rounding.)

Table B-1: Derivation of Estimates of Units With Moderate Rents in Both 2009 and 2011 (Weighted Counts in Thousands)

What Happened to 2009 Rental Units				Where 2011 Rental Units Came From			
	Forward-Looking Analysis	Sample	Weighted		Backward-Looking Analysis	Sample	Weighted
A	Moderate rent units in 2009	3,116	8,709	H	Moderate rent units in 2011	3,363	9,649
B	Lost to the stock	33	87	I	New construction	50	115
				J	Other additions to stock	25	57
C	Became owner stock	191	552	K	Came from owner stock	331	985
D	Became seasonal stock	104	275	L	Came from seasonal stock	145	402
E	Outflow to less affordable category	365	1,010	M	Inflow from less affordable category	399	1,131
F	Outflow to more affordable category	931	2,585	N	Inflow to more affordable category	921	2,656
G	Moderate rents in both 2009 and 2011	1,492	4,199	O	Moderate rents in both 2009 and 2011	1,492	4,304

Table B-2: Tracking Changes in the Moderate Rent Category: 2009–2011 (Weighted Counts in Thousands)

	Forward-Looking Analysis	Sample	Weighted
A	Moderate rent units in 2009	3,116	8,709
B	Lost to the stock	33	87
		0	0
C	Became owner stock	191	552
D	Became seasonal stock	104	275
E	Outflow to less affordable category	365	1,010
F	Outflow to more affordable category	931	2,585
G	Moderate rents in both 2009 and 2011	1,492	4,199
O-G	Increase in 2011 count of units in the moderate rent category due to change in weights	0	105
	Backward-Looking Analysis	Sample	Weighted
O	Moderate rents in both 2009 and 2011	1,492	4,304
I	New construction	50	115
J	Other additions to stock	25	57
K	Came from owner stock	331	985
L	Came from seasonal stock	145	402
M	Inflow from less affordable category	399	1,131
N	Inflow to more affordable category	921	2,656
H	Moderate rent units in 2011	3,363	9,649
	Row A minus rows B through F = Row G	1,492	4,200
	Row G + row O-G = Row O	1,492	4,304
	Row O plus rows I through N = Row H	3,363	9,650

Row O-G should not be thought of as an error term. As explained, it measures the impact of changing the perspective from 2009 to 2011.

The changes in weights enter into this portrayal in another way. The bottom row of Table 7 reports alternatively that the net inflow across all eight categories from less affordable categories was 509,000 units, and the net outflow to more affordable categories was 163,000 units. One would normally expect these numbers to be equal. However, inflows (rows M and N in Table B-1) are measured using weights appropriate to the 2011 stock, and outflows (rows E and F in Table B-1) are measured using weights appropriate to the 2009 stock. (The weighted numbers are based on a transposition of a matrix using the same sample units.) Table 7 implicitly assumes that the outflow occurs in a 2009 context and inflow occurs in a 2011 context.

Table B-3 shows how Table 7 is constructed, using the moderate rent category from Table B-3 as an example. Except for rounding, Table B-3 reproduces the moderate rent row from Table 7.

Table B-3: Construction of Moderate Rent Row in Table 7

		Rows Used	Estimate
1	2009 Rental Units	A	8,709
2	Net Additions – Losses	I+J-B	85
3	Net Non-Rental In	K+L-C-D	560
4	Net Inflow From Less Affordable Category	M-E	121
5	Net Inflow From More Affordable Category	N-F	71
6	Impact of Different Weights on Counts of Units in Same Category	O-G	105
7	Estimated 2011 Rental Stock	Sum 1-6	9,651
8	Actual 2011 Rental Units	H	9,649