American Housing Survey

Rental Market Dynamics: 2001-2003

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Overview

This paper seeks to answer two questions:

- Did the number of rental units affordable to lower income households grow or decline between 2001 and 2003?
  and
- What factors caused the number of affordable rental units to grow or decline during this period?

Unfortunately, limitations in the techniques available to answer these simple questions make the paper longer and more complex than would seem warranted.

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 different weights than 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 affordable rental housing between 2001 and 2003. Tables 1 and 2 compare the stories and conclude 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 2001 and 2003 to the rental units available in 2001. This picture answers the posed questions only partially, because these Tables provide information on only those 2003 rental units that were also rental units in 2001; they contain no information on newly constructed rental units or units that are rental in 2003 but were not rental in 2001. Tables 5 and 6 contain information on new construction and the movement of units from non-rental status in 2001 to rental status in 2003. They paint a precise picture, by affordability category, of where the units available for rent in 2003 came from in terms of their status in 2001. However, this picture also answers the posed questions only partially because it depicts only part of the 2001 rental stock; it does not provide information on units that were rental in 2001 but ceased to be part of the rental stock in 2003.

This paper then combines the two pictures even though the weights used in the separate pictures are not consistent. Tables 7 and 8 present two different combinations of the earlier analyses and explain how the combinations were constructed. Table 9 gathers information from Tables 1, 2, 7, and 8 to answer the two questions. Because weights are not fully consistent, Table 9 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 various 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 categories, and the gain or loss of units from the rental stock.

Background and Methodology

In recent years, discussions of urban policy and urban planning have frequently focused on the topic of housing affordability, i.e., whether, in a given area, there is an adequate supply of housing available at prices that low-income households who live in that area can afford. On a national level, this topic occupies a central place in publications such as HUD's biennial *Worst Case Needs* report or the Harvard Joint Center's *State of the Nation's Housing* report.[1]

To provide insights on this issue, housing analysts developed the tool of rental market dynamics.[2] 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 support for HUD and the Census Bureau in preparing the 2004 metropolitan AHS surveys for public release, as well as new research using the AHS. One of these research studies, *Components of Inventory Change: 2001-2003,* undertook a CINCH analysis using the 2001 and 2003 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 35 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 65 percent of local area median income),
- moderate rent (affordable to renters with incomes greater than 65 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),

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[1] *A Report On Worst Case Housing Needs In 1999: New Opportunity Amid Continuing Challenges*, U.S. Department of Housing and Urban Development, January 2001.
State of the Nation's Housing 2005, Joint Center for Housing Studies, Harvard University, 2005.

[2] See in particular: Kathryn P. Nelson and David A. Vandenbroucke, "Affordable Rental Housing: Lost, Stolen, or Strayed?," paper presented at the 1996 Mid-Year meeting of the American Real Estate and Urban Economics Association, Washington, DC, May 28, 1996, and *Rental Market Dynamics: Is Affordable Housing For The Poor An Endangered Species?*, Gregory J. Watson and Frederick J. Eggers, available at http://www.huduser.org/datasets/ahs/ahsReports.html#2.

[3] *Components of Inventory Change: 2001-2003*, Frederick J. Eggers and Fouad Moumen, a report prepared for the Department of Housing and Urban Development by ICF Consulting and Econometrica, Inc., August 2005. This paper is available at http://www.huduser.org/datasets/cinch.html.

- 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), and
- 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 rent-to-income ratio of 30 percent or less for the higher of the incomes that define the category.

The American Housing Survey (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.

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

- Housing Affordability Data System (HADS)[4]
- 2001-2003 CINCH variables and weights.[5]

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.[6] It differs from the AHS variable TENURE in two respects. OWNRENT has two states: owned or rented. TENURE has three states: owned, rent 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.[7,8] 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 COST07RELAMICAT, which put the unit into one of seven categories based on the ratio of total monthly housing costs to monthly adjusted median income for the locality.[9] Except for the non-market classification, these seven categories match the eight categories used in this paper.

[4] HADS is an experimental data system under development by the Office of Policy Development and Research, U.S. Department of Housing and Urban Development. Analysts interested in obtaining copies of the (provisional) documentation and SAS code should contact David A. Vandenbroucke (david_a._vandenbroucke@hud.gov).
[5] The data set and documentation are available at http://www.huduser.org/datasets/ahs/ahsReports.html#2.
[6] Here and elsewhere in the paper, words printed with all capital letters are the names of variables in different data sets. Exceptions include abbreviations such as AHS, CINCH, or HADS.
[7] 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.
[8] TENURE also does not apply to units whose occupants usually reside somewhere else, or units that were not interviewed because they were temporarily or permanently out of the housing stock. OWNRENT does not apply to these units as well.
[9] HADS uses only publicly available data: AHS data and HUD income limits. It uses no proprietary or confidential data.

The CINCH variables and weights data set was a product of the companion research piece. For all AHS units, the data set contains (1) a set of forward-looking CINCH weights (FLCINCHWT) that allow one to track from 2001 to 2003 those units that were part of the 2001 housing stock, and (2) a set of backward-looking CINCH weights (BLCINCHWT) that allow one to track from 2003 to 2001 those units that were part of the 2003 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 2001 housing unit was also in the 2003 housing stock or whether it had been lost to the stock for one of six reasons. BLSTATUS indicates whether a 2003 housing unit was also in the 2001 housing stock or whether it had been added to the stock for one of five reasons. The CINCH data set includes four additional variables that were constructed from OWNRENT and COST07RELAMICAT in HADS. These variables (FLRENT, BLRENT, FLAFFORD, and BLAFFORD) classify rental units as either non-market or belonging to one of the eight categories used in this paper.

Affordability Changes in the Rental Stock

This paper will use the CINCH weights discussed in the Background section to analyze changes in the affordability of the rental stock. The paper uses the CINCH weights instead of the regular AHS weights because the analysis needs non-zero weights for all units in both years. Specifically, the analysis needs weights in 2001 for units that are not part of the housing stock in that year but are part of the housing stock in 2003. The regular AHS weights ascribe a zero weight to such units in 2001. Similarly, the analysis needs weights in 2003 for units that are part of the 2001 housing stock but are not part of the 2003 housing stock. The regular AHS weights ascribe a zero weight to such units in 2003.

As a first step, the paper investigates whether the CINCH weights and the AHS weights depict similar changes in the rental stock between 2001 and 2003. The companion CINCH paper 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.[10] There are some important exceptions. The CINCH weights tend to underestimate mobile homes and trailers, units built between 2000 and 2004, units with Black householders, and owner-occupied units with monthly housing costs of less than $350. The CINCH weights tend to overestimate units outside metro areas and owner-occupied units with monthly housing costs of $1,250 or more. Despite the general good performance of the CINCH weights, this data check is necessary because rental dynamics analysis requires accurate measurement of changes in totals between years, a more difficult feat than accurately measuring totals in a given year.

[10] For example, the forward-looking CINCH analysis underestimates the number of renter households in 2001 with monthly housing costs of less than $350 by 0.2 percent, and the backward-looking CINCH analysis underestimates the number of rental households in 2003 with monthly housing costs of less than $350 by 2.1 percent.

Using regular AHS weights, Table 1 counts the number of occupied or vacant rental units in 2001 and 2003 and classifies them into one of eight affordability categories.[11] The regular AHS weights provide a benchmark for the rental dynamics analysis. According to the regular AHS weights, the rental stock, including both occupied and vacant units, increased by 686,000 units between 2001 and 2003, which is a 1.9 percent increase.[12]

Table 1: Rental Units by Affordability Class, 2001-2003, using regular AHS weights (all counts in thousands)

Rent groups	Rental in 2001 from forward-looking analysis	Rental in 2003 from backward-looking analysis	Change	Percent change
Non-market	8,310	8,035	-275	-3.3%
Extremely Low Rent	2,198	2,669	471	21.4%
Very Low Rent	10,578	11,073	495	4.7%
Low Rent	5,929	5,941	12	0.2%
Moderate Rent	6,105	6,134	29	0.5%
High Rent	2,121	1,721	-400	-18.9%
Very High Rent	698	880	182	26.1%
Extremely High Rent	946	1,117	171	18.1%
Total	36,885	37,571	686	1.9%

Table 2 counts the number of occupied or vacant rental units in 2001 and 2003 and classifies them into one of seven 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 849,000 units between 2001 and 2003, a 2.3 percent increase. These changes are larger than those recorded by the regular AHS weights.

Table 2: Rental Units by Affordability Class, 2001-2003, using CINCH weights (all counts in thousands)

Rent groups	Rental in 2001 from forward-looking analysis	Rental in 2003 from backward-looking analysis	Change	Percent change
Non-market	8,333	8,264	-69	-0.8%
Extremely Low Rent	2,359	2,805	446	18.9%
Very Low Rent	10,905	11,172	267	2.4%
Low Rent	5,975	5,972	-3	-0.1%
Moderate Rent	5,974	6,191	217	3.6%
High Rent	2,151	1,803	-348	-16.2%
Very High Rent	717	859	142	19.8%
Extremely High Rent	979	1,175	196	20.0%
Total	37,392	38,241	849	2.3%

[11] Table 1 uses WGT90GEO for the 2003 data and WGT00_90 for the 2001 data. WGT90GEO and WGT00_90 are weights that are based on the 2000 decennial census and that use metropolitan area definitions developed by the Office of Management and Budget based on the 1990 decennial census.
[12] Throughout the paper, sums and differences of counts and percentages may not equal the reported sums and differences because of rounding.

The CINCH weights also count more rental units: 37,392,000 in 2001 compared to 36,885,000 from the AHS weights, and 38,214,000 in 2003 compared to 37,571,000. The differences in total counts are small. Relative to the regular AHS weights, the CINCH weights count 1.4 percent more units in 2001 and 1.8 percent more units in 2003. The CINCH weights are crafted to produce estimates of the occupied rental stock that equal published Census Bureau estimates, and to produce estimates of total vacant units that equal published Census Bureau estimates. The observed differences appear to result from the CINCH weights overestimating vacant rental units and underestimating vacant owner units compared to the regular AHS weights.

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

- Both tables record large absolute and percentage increases among extremely low rent units, very high rent units, and extremely high rent units.
- Both tables record a large absolute and percentage decrease in high rent units.
- Both tables record large absolute but relatively small percentage increases in very low rent units.
- Both tables record very small absolute and percentage changes in low rent units, with the regular AHS weights showing a small gain and the CINCH weights showing a small decrease.

The regular AHS weights and the CINCH weights differ in reporting both affordability and changes in affordability in the following ways:

- The AHS weights show a small absolute and percentage increase in moderate rent units while the CINCH weights show a large absolute gain and modest percentage gain.
- The AHS weights show a large absolute decline and a modest percentage decline in the non-market units while the CINCH weights show small absolute and percentage decline.
- The CINCH weights show 7.3 percent more extremely low rent units in 2001 and 5.1 percent more in 2003 than the AHS weights.

None of these differences seriously diminish the legitimacy of the rental dynamics analysis reported in the remainder of this paper. Cautions are provided in interpreting the changes undergone by non-market units and moderate rent units.

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:

2003 rental stock in category *x* = 2001 rental stock in category *x*
– 2001 rental units in category *x* that moved to another category
– 2001 rental units in category *x* that are lost to the stock or become non-rental
+ 2001 rental units not in *x* that moved to category *x*
+ newly construction 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.[13] The solution in CINCH has been to split the problem in two. Forward-looking CINCH analysis takes the 2001 housing stock and explains what happens to those units by 2003, while backward-looking CINCH analysis takes the 2003 housing stock and explains where those units came from in terms of the 2001 housing stock. This paper will follow the same approach.

Forward-Looking Rental Dynamics

Table 3 tracks how the 37,392,000 rental units in the 2001 housing stock from Table 2 relate to the 2003 housing stock. Columns B through L explain where the 2001 rental units fit into the 2003 housing stock.

- If the units are still rental in 2003, they will be counted in columns B through I, depending upon how affordable they are in 2003.
- 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 units that are not in the 2003 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.

[13] See *Weighting Strategy For 2001-2003 Cinch Analysis* available at http://www.huduser.org/datasets/cinch.html.

Table 3: Forward-Looking Rental Dynamics Analysis, Counts: 2001-2003 (all numbers in thousands)

Rent groups	A Total in 2001	B Non-Market in 2003	C Extremely Low Rent in 2003	D Very Low Rent in 2003	E Low Rent in 2003	F Moderate Rent in 2003	G High Rent in 2003	H Very High Rent in 2003	I Extremely High Rent in 2003	J Owner Occupied in 2003	K Seasonal or Related Vacant in 2003	L Lost to Stock in 2003
Non-market	8,333	6,188	140	364	165	194	45	26	44	688	326	153
Extremely Low Rent	2,359	95	731	636	118	165	54	16	53	236	152	104
Very Low Rent	10,905	256	856	5,984	1,413	764	143	59	93	730	398	208
Low Rent	5,975	131	195	1,622	1,970	1,155	122	44	53	386	175	120
Moderate Rent	5,974	122	173	731	1,246	2,298	396	161	90	484	209	64
High Rent	2,151	41	64	188	184	578	515	169	79	221	79	34
Very High Rent	717	16	40	52	25	86	130	113	125	63	45	22
Extremely High Rent	979	22	72	68	61	78	46	92	357	101	57	25
Total	37,392	6,870	2,271	9,645	5,183	5,319	1,450	680	895	2,910	1,441	729

Table 4: Forward-Looking Rental Dynamics Analysis, Row Percentages: 2001-2003

Rent groups	A Total in 2001	B Non-Market in 2003	C Extremely Low Rent in 2003	D Very Low Rent in 2003	E Low Rent in 2003	F Moderate Rent in 2003	G High Rent in 2003	H Very High Rent in 2003	I Extremely High Rent in 2003	J Owner Occupied in 2003	K Seasonal or Related Vacant in 2003	L Lost to Stock in 2003
Non-market	8,333,000	74.3%	1.7%	4.4%	2.0%	2.3%	0.5%	0.3%	0.5%	8.3%	3.9%	1.8%
Extremely Low Rent	2,359,000	4.0%	31.0%	27.0%	5.0%	7.0%	2.3%	0.7%	2.3%	10.0%	6.4%	4.4%
Very Low Rent	10,905,000	2.3%	7.9%	54.9%	13.0%	7.0%	1.3%	0.5%	0.9%	6.7%	3.6%	1.9%
Low Rent	5,975,000	2.2%	3.3%	27.2%	33.0%	19.3%	2.0%	0.7%	0.9%	6.5%	2.9%	2.0%
Moderate Rent	5,974,000	2.0%	2.9%	12.2%	20.9%	38.5%	6.6%	2.7%	1.5%	8.1%	3.5%	1.1%
High Rent	2,151,000	1.9%	3.0%	8.7%	8.5%	26.9%	24.0%	7.8%	3.7%	10.3%	3.7%	1.6%
Very High Rent	717,000	2.2%	5.6%	7.2%	3.5%	12.0%	18.1%	15.8%	17.4%	8.8%	6.2%	3.1%
Extremely High Rent	979,000	2.3%	7.4%	6.9%	6.3%	7.9%	4.6%	9.4%	36.5%	10.3%	5.8%	2.5%
Total	37,392,000	18.4%	6.1%	25.8%	13.9%	14.2%	3.9%	1.8%	2.4%	7.8%	3.9%	2.0%

Non-market rental units show much greater stability than units in the other seven affordability categories. Almost three-quarters of the 2001 non-market units are non-market in 2003 as well. Units renting for cash show greater movement across categories. Among units that were very low rent in 2001, 54.9 percent were very low rent in 2003, whereas only 15.8 percent of the units that were very high rent in 2001 are still very high rent in 2003.

The numbers in Tables 3 and 4 suggest that some rental units move far from their initial category. For example, 2.9 percent of the units that were moderate rent in 2001 became extremely low rent in 2003, while 1.5 percent became extremely high rent. While 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 the variables if respondents fail to answer the question. 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.[14]

Of the 37,392,000 rental units in 2001, 5,080,000 (or 13.6 percent) were no longer in the rental stock in 2003. Over half of these losses were due to changes in tenure, with 2,910,000 rental units becoming owner-occupied in 2003. Another 1,441,000 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 729,000 rental units were no longer in the housing stock in 2003. Some of these losses were permanent, that is, the units were demolished or destroyed; some losses were potentially reversible, for example, units being used for non-residential purposes.

Movement into owner-occupancy occurred for 7.8 percent of all rental units. The percentage of movement across the categories ranged from a high of 10.3 percent for extremely high rent units to a low of 6.5 percent for low rent units. While units in the highest rent categories were somewhat more likely to become owner-occupied, there was substantial movement in this direction among non-market and extremely low rent units. Among 2001 rental units, 3.9 percent were seasonal or related vacant in 2003. Again, units in the highest rent categories were more likely to move out of the rental stock for this reason. However, extremely low rent units displayed the highest rate of movement into this status. Two percent of the 2001 rental units were lost to the housing stock by 2003. Extremely low rent units were more than twice as likely to be lost, 4.4 percent vs. 2.0 percent. Very high rent units and extremely high rent units had above average loss rates as well.

There appears to be a consistent pattern across columns J, K, and L. Movement out of the rental stock is greatest for extremely low rent, very high rent, and extremely high rent units. The other categories had below average or near average rates of movement out. Taken together 13.6 percent of 2001 rental units were no longer rental in 2003. The rates by category are: non-market (14.0 percent), extremely low rent (20.8 percent), very low

[14] See page 10 of *Rental Market Dynamics: Is Affordable Housing For The Poor An Endangered Species?*.

rent (12.3 percent), low rent (11.4 percent), moderate rent (12.7 percent), high rent (15.5 percent), very high rent (18.1 percent), and extremely high rent (18.7 percent).

Backward-Looking Rental Dynamics

Table 5 tracks how the 38,241,000 rental units in the 2003 housing stock from Table 2 relate to the 2001 housing stock. Columns B through M explain where the 2003 rental units fit into the 2001 housing stock.

- If the units were also rental in 2001, they will be counted in columns B through I, depending upon how affordable they are in 2001.
- If the units were 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 were vacant but not for rent or sale are counted in column K.
- Column L counts units that were newly constructed between 2001 and 2003.
- Column M counts units that were temporary losses to the housing stock in 2001.

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

Table 6 presents the same information as Table 5, but columns B through M are now percentages of column A. Columns B through M sum to 100 percent in each row.

As was the case in the forward-looking analysis, non-market rental units show much greater stability than units in the other seven affordability categories. Of the 2003 non-market units, 76.5 percent were non-market in 2001 as well. Units renting for cash show greater movement across categories. Among units that were very low rent in 2003, 54.4 percent were very low rent in 2001, whereas only 13.5 percent of the units that were very high rent in 2003 were also very high rent in 2001.

Of the 38,241,000 rental units in 2003, 5,406,000 (or 14.1 percent) were not in the rental stock in 2001. Over half of these gains were due to changes in tenure, with 3,093,000 rental units having been owner-occupied in 2001. Another 1,223,000 units had been seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. New construction added 677,000 rental units. Finally, 413,000 rental units were other additions to the housing stock since 2001. These include mobile home move-ins, units created by mergers and conversions, and units that had been used for non-residential purposes.

Movement from owner-occupancy occurred for 8.1 percent of all rental units. The percentage of movement across the categories ranged from a high of 10.8 percent for extremely high rent units to a low of 6.9 percent for low rent units. Units in the highest rent categories were more likely to have been owner-occupied, but non-market and extremely low rent units had higher than average propensities to have been owner-occupied.

Table 5: Backward-Looking Rental Dynamics Analysis, Counts: 2001-2003 (all numbers in thousands)

Rent groups	A Total in 2003	B Non-Market in 2001	C Extremely Low Rent in 2001	D Very Low Rent in 2001	E Low Rent in 2001	F Moderate Rent in 2001	G High Rent in 2001	H Very High Rent in 2001	I Extremely High Rent in 2001	J Owner Occupied in 2001	K Seasonal or Related Vacant in 2001	L New Construc -tion	M Other Addition
Non-market	8,264	6,319	102	285	154	138	48	18	27	739	199	136	100
Extremely Low Rent	2,805	137	742	875	197	177	64	40	76	274	158	12	53
Very Low Rent	11,172	332	643	6,073	1,667	755	192	53	69	778	352	107	152
Low Rent	5,972	151	120	1,428	1,992	1,273	188	26	64	412	188	93	38
Moderate Rent	6,191	173	169	769	1,173	2,328	587	92	80	500	137	135	47
High Rent	1,803	40	54	143	121	395	524	134	47	190	63	89	2
Very High Rent	859	24	16	58	44	162	167	116	96	74	53	42	7
Extremely High Rent	1,175	40	53	92	54	88	78	125	365	127	74	63	16
Total	38,241	7,218	1,899	9,723	5,402	5,317	1,848	605	824	3,093	1,223	677	413

Table 6: Backward-Looking Rental Dynamics Analysis, Row Percentages: 2001-2003

Rent groups	A Total in 2003	B Non-Market in 2001	C Extremely Low Rent in 2001	D Very Low Rent in 2001	E Low Rent in 2001	F Moderate Rent in 2001	G High Rent in 2001	H Very High Rent in 2001	I Extremely High Rent in 2001	J Owner Occupied in 2001	K Seasonal or Related Vacant in 2001	L New Construc -tion	M Other Addition
Non-market	8,264,000	76.5%	1.2%	3.5%	1.9%	1.7%	0.6%	0.2%	0.3%	8.9%	2.4%	1.6%	1.2%
Extremely Low Rent	2,805,000	4.9%	26.4%	31.2%	7.0%	6.3%	2.3%	1.4%	2.7%	9.8%	5.6%	0.4%	1.9%
Very Low Rent	11,172,000	3.0%	5.8%	54.4%	14.9%	6.8%	1.7%	0.5%	0.6%	7.0%	3.1%	1.0%	1.4%
Low Rent	5,972,000	2.5%	2.0%	23.9%	33.3%	21.3%	3.1%	0.4%	1.1%	6.9%	3.1%	1.6%	0.6%
Moderate Rent	6,191,000	2.8%	2.7%	12.4%	19.0%	37.6%	9.5%	1.5%	1.3%	8.1%	2.2%	2.2%	0.8%
High Rent	1,803,000	2.2%	3.0%	7.9%	6.7%	21.9%	29.1%	7.4%	2.6%	10.5%	3.5%	5.0%	0.1%
Very High Rent	859,000	2.8%	1.9%	6.8%	5.1%	18.9%	19.5%	13.5%	11.2%	8.6%	6.1%	4.8%	0.8%
Extremely High Rent	1,175,000	3.4%	4.5%	7.8%	4.6%	7.5%	6.7%	10.6%	31.0%	10.8%	6.3%	5.3%	1.4%
Total	38,241,000	18.9%	5.0%	25.4%	14.1%	13.9%	4.8%	1.6%	2.2%	8.1%	3.2%	1.8%	1.1%

Among 2003 rental units, 3.2 percent were seasonal or related vacant in 2001. Again, units in the highest rent categories were more likely to have come from this source. However, extremely low rent units had a high propensity as well.

Of all 2003 rental units, 1.8 percent came from new construction. The three highest rent categories had more than double the average rate of new construction. Another 1.1 percent came from other additions. Non-market, extremely low rent, and very low rent units had above average rates of 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, 14.1 percent of 2003 rental units were not rental in 2001. The rates by category are: non-market (14.2 percent), extremely low rent (17.7 percent), very low rent (12.4 percent), low rent (12.2 percent), moderate rent (13.2 percent), high rent (19.1 percent), very high rent (20.4 percent), and extremely high rent (23.8 percent).

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 2001 rental stock and estimate the 2003 rental stock by (1) using forward-looking analysis to track the 2001 rental stock to 2003 and then (2) adding additions to the rental stock since 2001 from the backward-looking analysis. Alternatively, one can start with the 2003 rental stock and estimate the 2001 rental stock by (1) using backward-looking analysis to project the 2003 rental stock back to 2001 and then (2) adding rental units that were lost to the rental stock between 2001 and 2003 from the forward-looking analysis. Table 7 does the first of these combinations while Table 8 does the second.

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 7 and 8 begins with two inconsistencies between the tables:

- Table 7 starts with the forward-looking estimate of the 2001 rental stock and produces an estimate of the 2003 rental stock that is 522,000 less than the estimate from the backward-looking analysis. Table 8 starts with the backward-looking estimate of the 2003 rental stock and produces an estimate of the 2001 rental stock that is 522,000 greater than the forward-looking estimate.[15]

[15] The difference is 522,000 in both cases because of the symmetry in the estimation procedure. The difference between columns A and K is 848,000 in both tables. The movement among affordability

- Table 7 estimates that 18,156,000 units were in the same affordability category in both 2001 and 2003; Table 8 estimates this number as 18,458,000. These estimates are based on the 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 7 and 8. 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 7, the estimation process runs from left to right. The calculations begin with the 2001 rental stock in 2001 (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 2001, remained rental in 2003, and were in the same affordability category in both years. Column F equals Column A minus the sum of columns C, D, and E. Columns G and H add units that came from other affordability categories and Column I adds units that were non-rental in 2001. Column J is the estimate for 2003 produced by this process. For comparison, column K contains the estimates for 2003 from the backward-looking analysis.

In Table 8, the estimation process runs from right to left. The calculations begin with the 2003 rental stock (column K). The backward-looking analysis removes units that were not rental in 2001 (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 2003, were also rental in 2001, and were in the same affordability category in both years. Column F is column K minus the sum of columns G, H, and I. Columns D and E add units that had moved out of the affordability class since 2001 and Column C adds units that had moved out of the rental stock since 2001. Column B is the estimate for 2001 produced by this process. For comparison, Column A contains the forward-looking estimate for the 2001 rental stock.

Columns A and K are the same in both Tables; these columns come from Table 2. 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 7 estimates the change in the size of each category by subtracting column A from column J, while Table 8 estimates the change by subtracting column B from column K.

Columns C and I are identical in both Tables. The difference between column I and column C is an estimate for each affordability category of the net gain between 2001 and 2003 from outside the rental stock.

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categories netted across all categories must be zero. So the only source of net gain or loss is the difference between columns I and C, which is 326,000 in both tables. 522,000 = 848,000 - 326,000.

Table 7: Tracking the Rental Stock Forward (all counts in thousands, source of estimates in parentheses)

Rent groups	A 2001 Rental Units (forward)	B Not applicable	C 2001 Rental Units Non-Rental in 2003 (forward)	D In Less Affordable Categories in 2003 (forward)	E In More Affordable Categories in 2003 (forward)	F In Same Affordability Category in Both Years (forward)	G In More Affordable Category in 2001 (forward)	H In Less Affordable Category in 2001 (forward)	I 2003 Rental Units Non-rental in 2001 (backward)	J Estimated 2003 Rental Stock (combined)	K 2003 Rental Units (backward)
Non-market	8,333		1,167	978	0	6,188	0	682	1,174	8,044	8,264
Extremely Low Rent	2,359		491	1,042	95	731	140	1,400	496	2,767	2,805
Very Low Rent	10,905		1,336	2,473	1,112	5,984	1,000	2,660	1,388	11,033	11,172
Low Rent	5,975		682	1,375	1,948	1,970	1,697	1,517	730	5,913	5,972
Moderate Rent	5,974		757	647	2,272	2,298	2,279	742	819	6,138	6,191
High Rent	2,151		334	248	1,054	515	759	175	344	1,794	1,803
Very High Rent	717		130	125	349	113	474	92	175	855	859
Extremely High Rent	979		183	0	439	357	538	0	279	1,175	1,175
Total	37,392		5,080	6,887	7,268	18,156	6,887	7,268	5,406	37,718	38,241

Table 8: Tracking the Rental Stock Backward (all counts in thousands, source of estimates in parentheses)

Rent groups	A 2001 Rental Units (forward)	B Estimated 2001 Rental Stock (combined)	C 2001 Rental Units Non-Rental in 2003 (forward)	D In Less Affordable Categories in 2003 (backward)	E In More Affordable Categories in 2003 (backward)	F In Same Affordability Category in Both Years (backward)	G In More Affordable Category in 2001 (backward)	H In Less Affordable Category in 2001 (backward)	I 2003 Rental Units Non-rental in 2001 (backward)	J Not applicable	K 2003 Rental Units (backward)
Non-market	8,333	8,385	1,167	898	0	6,319	0	770	1,174		8,264
Extremely Low Rent	2,359	2,390	491	1,055	102	742	137	1,430	496		2,805
Very Low Rent	10,905	11,059	1,336	2,490	1,160	6,073	974	2,737	1,388		11,172
Low Rent	5,975	6,083	682	1,393	2,018	1,992	1,700	1,551	730		5,972
Moderate Rent	5,974	6,074	757	646	2,343	2,328	2,285	759	819		6,191
High Rent	2,151	2,182	334	246	1,079	524	754	181	344		1,803
Very High Rent	717	734	130	125	364	116	472	96	175		859
Extremely High Rent	979	1,007	183	0	459	365	531	0	279		1,175
Total	37,392	37,915	5,080	6,853	7,524	18,458	6,853	7,524	5,406		38,241

Columns D, E, G, and H measure movement of rental units between affordability categories. For each category, the gain from these movements between 2001 and 2003 is:

column G + column H - column D - column E

This sum for each affordability category will differ between Table 7 and Table 8. However, the sum over all categories must equal zero in both Tables.

To facilitate the discussion, Table 9 collects the information from Tables 7 and 8. Table 9 also contains the estimates using AHS weights from Table 1. Using Table 9, the paper discusses each affordability category separately.

Table 9: Changes in the Rental Stock by Affordability Category, Combined Analysis (all counts in thousands)

Rent groups	AHS estimates of 2001-2003 change (Table 1)	CINCH estimate of 2001-2003 change (column K - column A and Table 2)	Table 7 estimate of 2001-2003 change (column J - column A)	Table 8 estimate of 2001-2003 change (column K - column B)	Net Gain from non-rental sources (column I - column C)	Table 7 estimate of net gain from movement across categories	Table 8 estimate of net gain from movement across categories
Non-market	-275	-69	-289	-121	7	-296	-128
Extremely Low Rent	471	446	408	415	5	403	410
Very Low Rent	495	267	128	113	52	76	61
Low Rent	12	-2	-61	-111	48	-110	-159
Moderate Rent	29	217	164	117	62	102	55
High Rent	-400	-348	-357	-380	10	-367	-389
Very High Rent	183	142	138	125	45	93	79
Extremely High Rent	171	196	196	168	96	100	72
Total	686	848	326	326	326	0	0

- Non-market units:
  - The number of non-market units declined between 2001 and 2003. Both Table 7 and 8 show a larger decline than the CINCH estimates. The AHS weights also showed a larger decline.
  - Both tables indicate that all the change came from a net outflow of units from the non-market category into other affordability categories.

- Extremely low rent units
  - All four estimates show a substantial increase in the number of extremely low rent units.
  - Both tables show that all of the gain came from a net inflow of units from other affordability categories.

- Very low rent units
  - All four measures show an increase in the number of very low rent units.

  - The increase appears to be due in roughly even amounts to a net inflow of units from non-rental sources and a net inflow from other affordability categories.

- Low rent units
  - The CINCH estimate and the AHS estimate show virtually no change in the count of low rent units. Both Table 7 and 8 show declines.
  - The tables agree that, to the extent there was a loss, it resulted from net outflow of units to other affordability categories that was larger than the net inflow of units from non-rental sources.

- Moderate rent units
  - The AHS weights show almost no change in the number of moderate rent units. However, the other three methods show an increase in the number of moderate rent units.
  - Table 7 suggests that net inflow from other affordability categories was roughly twice as large as net inflows from non-rent sources. Table 8 portrays these contributions as roughly equal in magnitude.

- High rent units
  - All four estimates show a very large decline in the number of high rent units.
  - Both tables suggest that all of the loss resulted from movement of high rent units into other affordability categories.

- Very high rent units
  - All four methods show an increase in the number of very high rent units.
  - The tables suggest that increase resulted from both a net inflow of units from non-rental sources and a net inflow of units from other affordability categories. The latter source appears to be approximately twice as important as the former.

- Extremely high rent units
  - All four methods show a substantial gain in the number of extremely high rent units.
  - Tables 7 and 8 suggest that the gain was due in roughly equal amounts to a net inflow from non-rental sources and a net inflow from other affordability categories.

Conclusion

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

- Did the number of rental units affordable to lower income households grow or decline between 2001 and 2003?

The two most affordable categories—the extremely low rent and very low rent categories—posted large increases in the number of units between 2001 and 2003. The estimated gain in these two categories combined ranged from over 500,000 units (the Table 7 and Table 8 estimates) to almost one million units (the AHS weights estimate).

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

  The extremely low rent category grew because it benefited from a net inflow of units from other affordability categories. The very low rent unit benefited, in roughly equal amounts, from a net inflow of units from other affordability categories and from a net inflow of units from non-rental sources. Non-rental sources of gain include: former owner-occupied units, former seasonal or other vacant units, new construction, and the return of units to the housing stock. These gains exceeded losses to owner-occupancy, seasonal use, and permanent or temporary losses to the housing stock.