

**Components of  
Inventory Change  
And Rental Dynamics:  
Hartford  
1996-2004**

July 2006

Econometrica, Inc. and  
ICF Consulting  
under contract to:

U.S. Department of Housing  
and Urban Development  
*Office of Policy Development  
and Research*

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## **Acknowledgements**

This report was produced by Econometrica, Inc., under Contract No. GS-10F-0269K, Order No. C-CHI-00809, for the U.S. Department of Housing and Urban Development (HUD). Cyrus Baghelai served as Econometrica's Project Director, and the primary analyses and report writing were performed by Frederick J. Eggers and Fouad Moumen. The authors thank David A. Vandembroucke, the HUD Government Technical Representative, for many helpful suggestions and for his assistance in obtaining needed information from the Census Bureau. The authors also thank Barbara Williams of the Census Bureau for her assistance in answering numerous questions.

# Components of Inventory Change and Rental Market Dynamics: Hartford 1996-2004

## Overview

Components of Inventory Change (CINCH) and rental market dynamics are two techniques for explaining how changes that take place in a housing market over time came about in physical (bricks and mortar) terms. CINCH focuses first on the overall number and then the characteristics of units at different times. Using CINCH methods, analysts answer such question as: “What happened to the x units that disappeared from the housing stock between the beginning and the end of the period?” or “Where did the increase in owner-occupied units come from?” Rental market dynamics, which is really a type of CINCH analysis, focuses on the rental market with particular emphasis on the affordability of rental housing. Using rental market dynamics techniques, analysts answer such questions as: “Have the number of rental units affordable to households with very low incomes increased or decreased over the period?” or “What happened to the rental units that were affordable to low-income households at the beginning of the period?”

This report focuses on the Hartford metropolitan housing market over the period between 1996 and 2004. It is one of 13 reports based on local American Housing Surveys conducted in 2004; these 13 metropolitan areas were previously surveyed in either 1995 or 1996.<sup>1</sup>

CINCH and rental market dynamics have both forward-looking and backward-looking components. The forward-looking component starts with the housing stock available at the beginning of the period and then, looking at the end of the period, attempts to explain what happened to those units. Possible answers include some units still exist and serve the same market, some units still exist but serve a different market, some units have been demolished or destroyed in natural disasters, or some units are being used for nonresidential purposes. The backward-looking component starts with the housing stock available at the end of the period and, looking at the beginning of the period, attempts to explain where those units came from. Possible answers include some units existed at the beginning of the period and served the same market, some units existed at the beginning of the period but served a different market, some units were newly constructed over the period, or some units were being used for nonresidential purposes at the beginning of the period. Neither CINCH nor rental market dynamics try to track the experience of a unit over the entire period; both are interested only in the beginning and the end of the period. For example, a housing unit in 1996 may have become a medical office in 1997 but returned to being a housing unit in 2000. CINCH would record this unit as having

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<sup>1</sup> See <http://www.huduser.org/datasets/cinch.html> for examples of previous CINCH and rental dynamics studies.

undergone no change over the period from 1996 to 2004. In research jargon, CINCH and rental market dynamics are *comparative static* analyses.

Ideally one would want to combine the forward-looking and backward-looking analyses to produce a complete accounting that can explain the beginning and the end consistently in terms of units that existed in both periods, losses from the stock over the period, and additions to the stock over the period. The research in this report uses the AHS, which is a sample of units at both points in time, and previous research has shown that creating sample weights that take both periods into account can generate some inconsistent or inaccurate results. For this reason, recent CINCH and rental market dynamics studies have separated the forward-looking and backward-looking components. This paper will do the same. (Weighting is explained briefly in Appendix B and more fully in a separate paper referenced in that appendix.)

The remainder of this report consists of four sections:

- An explanation of how to read the CINCH tables.
- Two sets of four tables each: a set of forward-looking tables tracing the movement of units from 1996 to 2004 and identifying how units were lost to the housing stock; and a set of backward-looking tables tracing where 2004 units came from and distinguishing between units that were part of the stock in 1996 and units that were additions to the stock since 1996.
- Two tables and accompanying discussion that highlight interesting changes in the Hartford housing stock between 1996 and 2004.
- A brief discussion of the rental market dynamics results using CINCH-like tables.

Two appendices explain how the results were tested and how the weights were created.

### ***How to Read CINCH Tables***

Rows and columns serve different purposes in CINCH tables. The rows identify classes of units to be analyzed. The columns trace those units either forward or backward.

The forward-looking tables are concerned with what happened to the 1996 housing stock by 2004. There are three basic dispositions of 1996 units: units that continue to exist in 2004 with the same characteristics (or serving the same market), units that continue to exist in 2004 but with different characteristics (or serving a different market), and units that were lost to the stock.

The backward-looking tables are concerned with where the 2004 housing stock came from in reference to 1996. There are three basic sources of 2004 units: units that existed in 1996 with the same characteristics (or serving the same market),

units that existed in 1996 but with different characteristics (or serving a different market), and units that are additions to the housing stock.

The essence of the CINCH analysis lies in the columns because they specify the state of a unit in the other time period.

### **Columns Common to both Forward-Looking and Backward-Looking Tables:**

- The first and last columns contain the row numbers. The row numbers are identical for the same tables in the forward-looking and backward-looking sets.

Columns A through E set up the analysis and track units that exist in both periods.

- Column A specifies the characteristic that defines the subset of the stock that is being tracked forward or backward in a particular row. For example, row 2 of Table 1 focuses on occupied units; row 15 focuses on units built in 1985 through 1989.
- Column B gives the estimate published in the AHS report for the number of units that satisfy the conditions specified in column A. For example, the 1996 AHS report for Hartford counted 440,000 occupied units (row 2, column B, forward-looking Table 1); the 2004 AHS report counted 463,000 occupied units (row 2, column B, backward-looking Table 1).
- Column C gives the CINCH estimate of the number of units that satisfy two conditions: (a) being part of the housing stock in the relevant year (1996 for the forward-looking tables and 2004 for the backward-looking tables), and (b) satisfying the condition in column A. CINCH uses different weights than those used in preparing the published AHS reports. Therefore, CINCH estimates can differ from AHS estimates for particular subsets of the housing stock. As explained in the appendix, the weights were created to match AHS published totals for rows 2 through 4 of Table 1 and rows 2 and 4 of Table 4. This perfect match will not be true of other rows.<sup>2</sup>
- Column D is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, and (b) continue to belong to the subset defined by column A. For example, column D of row 2 of forward-

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<sup>2</sup> Columns B and C will also match, except for rounding, in row 1 of Table 1 because row 1 is defined as the sum of rows 2 through 4. Categories for which the CINCH weights seem consistently to have trouble matching the published numbers were: the number of mobile homes, units built between 2000-2004, units built between 1995-1999, rental units that do not have a cash rent, and monthly housing costs less than \$350 for owners. In a few other cases, the weighted numbers consistently fail to match the published totals, but the authors believe the differences result because the Census Bureau created the published totals using information not available on the public use files or because of coding differences. These cases are: the reasons for incomplete plumbing and households receiving welfare or SSI payment.

looking Table 1 estimates that 403,800 of the occupied units from 1996 were also occupied in 2004.

- Column E is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, but (b) no longer belong to the subset defined by column A. Column E of row 2 indicates that 26,800 units that were occupied in 1996 are still part of the housing stock in 2004 but are no longer occupied. In some cases, the analysis will not allow a unit to change characteristics between the base year and the other year. Examples include type of structure, year built, and number of stories; these are characteristics that are considered impossible or unlikely to change.

### Columns Unique to Forward-Looking Tables

In forward-looking tables, columns F through K track what happened to units that were lost from 1996 to 2004.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2004 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 800 were lost to mergers and conversions.
- Column G is the CINCH estimate of the number of mobile homes from column C that were moved out during the period. Among occupied units, no mobile homes were moved out.<sup>3</sup>
- Column H is the CINCH estimate of the number of units that from column C that became nonresidential at the end of the period. For example, a real estate firm, a tax preparation office, a palm reader, or some other business might buy or rent a house to use for business rather than residential purposes.<sup>4</sup> Among occupied units, 1,400 became nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were demolished or were destroyed by fires or natural disasters by 2004. In this case, 4,200 units were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2004 were condemned or that were no longer usable for housing because of extensive damage. In Hartford, 1,500 occupied units were lost because of damage or similar cause.

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<sup>3</sup> The AHS does not trace where the mobile home is moved to. The move may be within the metropolitan area or outside the metropolitan area. Similarly, column G in the backward-looking tables does not distinguish between move-ins from within or from outside the metropolitan area.

<sup>4</sup> If the owner or tenant both lives in a unit and conducts business out of the unit, the AHS considers the unit to be residential. So nonresidential means strictly no residential use.

- Column K is the CINCH estimate of the number of units from column C that were lost by 2004 for other reasons. These include units that the Census Bureau eliminated for sampling purposes and other miscellaneous losses. Among occupied units, there were 1,400 units lost for these miscellaneous reasons.

The columns form a closed system. Column C counts the number of units tracked; columns D through K account for all the possible outcomes. Therefore, column C minus the sum of columns D through K always equals zero, except for rounding.<sup>5</sup>

## Columns Unique to Backward-Looking Tables

In backward-looking tables, columns G through K track where units came from that are part of the housing stock in 2004 but were not part of the 1996 housing stock.<sup>6</sup>

- Column G is the CINCH estimate of the number of mobile homes from column C that were moved in during the period. Among occupied units, no mobile homes were moved in (row 2, column G, of backward-looking Table 1).<sup>7</sup>
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 1996. Among occupied units, 800 had been nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 1996 and 2004. Among occupied units, 23,800 units were newly constructed.
- Column J is the CINCH estimate of the number of units from column C that were added by 2004 by the recovery of units that had been temporarily lost to the housing stock because occupancy was prohibited in 1996, or the interior of the unit was exposed to the elements, or for reasons “not classified.” The 2004 occupied housing stock includes 1,100 recovered units.
- Column K includes units added by the Census Bureau as sample adjustments. Sample adjustments represent 800 occupied units in 2004.

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<sup>5</sup> The weighted numbers are rounded to the nearest 100 to match practices used by the Census Bureau in the AHS publications.

<sup>6</sup> The backward-looking tables do not contain a column F for units added through mergers and conversions. In 2004, the Census Bureau did not code the variable that would normally identify units created from mergers and conversions (REUAD=7 or 8).

<sup>7</sup> In 2004, the Census Bureau did not code the variable that would normally identify mobile home move-ins (REUAD=4). We estimated these from another variable (NOINT=13).

## Table 1

Table 1 focuses on the general housing characteristics of the stock. Row 1 provides the highest level CINCH overview of the stock. For this row, column A specifies no conditions other than being part of the stock in the relevant year.

Rows 2-4 divide the housing stock by use. By Census Bureau definition, the number of occupied non-seasonal units equals the number of households. Because households are the basis for all the analyses in Tables 2 through 4, it is important to get a good starting point for these estimates. For this reason, the weights are designed to match published AHS totals for occupied units (by owner-occupied and renter-occupied), vacant units, and seasonal units.

Rows 5-12 divide the housing stock by type of structure to see what type of units account for losses.<sup>8</sup> Column E is forced to be zero on the grounds that changes in structure types are extremely rare and that any observed changes are most likely data errors.

Rows 13-24 divide the housing stock by year built.<sup>9</sup> The published reports use the categories 1990-1994, 1995-1999, and 2000-2004; this report uses the same categories in Backward-Looking Table 1 but uses 1990-1996 for row 15 in Forward-Looking Table 1.<sup>10</sup> Column E is again forced to be zero.

Rows 25-31 and 32-36 divide the housing stock by two different measures of interior space, the number of rooms and the number of bedrooms.<sup>11</sup>

Rows 37-42 focus on multiunit structures only and divide them by number of stories. Column E is forced to be zero and, depending on the metropolitan area, the Census Bureau may suppress information, forcing some rows to be zero. For the 1996 Hartford AHS public use file, the Census Bureau reported all units in structures with 7 or more stories in row 41 and reported no units in row 42. The published reports contain matching data for row 37 only.

Rows 43-44 divide the housing stock between central cities units and suburban residences to see how the observed changes vary by location. Rows 45-46 divide the housing stock by whether or not the occupants have moved in within the last 2 calendar years to see if certain units consistently have high turnover, and to see if high turnover units are more susceptible to loss.

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<sup>8</sup> In general, the CINCH estimates exceed published AHS estimates for single-family detached units and fall short of the published AHS estimates for manufactured homes by roughly equal amounts.

<sup>9</sup> Rows 13 and 14 are not included in Forward-Looking Table 1, because the 1996 housing stock cannot contain units built after 1996.

<sup>10</sup> We use REUAD=3 and not year built to identify new construction. For this reason, there are units built after 1995 that are not considered new construction. Year built is obtained from the respondent and may be inaccurate.

<sup>11</sup> Because of small sample sizes in the losses and additions columns, we combined room categories that the published reports list separately.



## Table 2

This table looks at issues related to the physical quality of units. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-3 look at whether the units have complete kitchens, that is, have an installed sink with piped water, a mechanical refrigerator, and built-in burners for the exclusive use of the occupants. Rows 4-5 look at whether the units have complete plumbing facilities, that is, hot and cold piped water, a flush toilet, and a bathtub or shower inside the structure for the exclusive use of the occupants. Rows 6-9 look at each of these requirements separately.<sup>12</sup> In the 1996 AHS, the published reports separate out the “exclusive use” category; in the data used for this report, these units show up in row 8. Rows 2-3, 4-5, and 6-9 separate out good units from the least desirable units based on kitchen and bath equipment.

Rows 10-15 look at how units obtain water and dispose of sewage.

Rows 16-21 look at units with severe physical problems. Rows 17-21 identify specific types of serious deficiencies. Row 16 counts the units having one or more of these deficiencies. Rows 22-27 look at units with moderate problems. Rows 23-27 identify specific types of deficiencies. Row 22 counts the units having one or more of these deficiencies.<sup>13</sup> These rows are in the analysis to answer two questions: whether poor-quality units in one year are also poor-quality units in the other year, and whether poorer quality units are more likely to be lost.

## Table 3

This table pertains to the characteristics of occupants. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1. In all cases, the analysis seeks to find out how stable occupancy characteristics are over time, and what part of the market was served by units that were lost between 1996 and 2004.

Rows 2-3 look at the age of the householder. Rows 4-5 look at whether or not the household includes children. Rows 6-11 look at the race or ethnicity of the householder.<sup>14</sup> Rows 12-14 look at three possible sources of household income.

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<sup>12</sup> Row 9 is not included in Forward-Looking Table 2, because the public use file does not contain the information needed to identify facilities available “for exclusive use” of the household.

<sup>13</sup> For definitions of serious and moderate problems, see pages 990 and 991 of the AHS Codebook, version 1.78, at [http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS\\_Codebook.pdf](http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf).

<sup>14</sup> In compliance with new federal guidelines, the 2004 AHS used different categories for recording race. For 2004, this paper defined “White” as “White only”; Black as “Black only”; and “other” as all other answers.

## Table 4

Table 4 pertains to tenure, income, and housing costs. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-4 focus on tenure to see the extent to which units change tenure characteristics and whether rental or owner-occupied units are more likely to be lost.

Rows 5-10 characterize the rental stock using 6 categories based on monthly housing costs. Row 10 identifies units provided to tenants for no cash rents, e.g., units provided to maintenance or management personnel or units provided to relatives. Rows 16-20 identify owner-occupied units by total monthly housing costs.

Rows 11-15 track rental units by household income; rows 21-25 track owner-occupied units by household income.<sup>15</sup>

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<sup>15</sup> The published reports list more categories for both monthly housing costs and household income. This report combined categories for two reasons. First, the sample size in each metropolitan area is small, and therefore larger categories provide more stable measurement of the various types of losses and additions. Second, columns D and E track whether the units in each category remain occupied and stay in the same cost or income category. The combined categories create more interesting analysis because bigger changes in monthly housing costs or income are needed to move between broader categories.

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**Forward-Looking Table 1: Structural and Location Characteristics – All Housing Units**

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	<b>Total</b>	480,200	480,200	467,500	0	1,100	0	1,900	5,400	2,100	2,300	1
	<b>Occupancy Status</b>											
2	Occupied	440,000	440,000	403,800	26,800	800	0	1,400	4,200	1,500	1,400	2
3	Vacant	37,900	37,900	6,900	28,200	200	0	300	1,200	600	500	3
4	Seasonal	2,300	2,300	1,200	600	0	0	100	0	0	400	4
	<b>Units in Structure</b>											
5	1, detached	270,400	270,100	266,900	0	0	0	700	900	400	1,200	5
6	1, attached	32,100	32,700	32,500	0	0	0	0	100	0	0	6
7	2 to 4	87,000	86,100	81,400	0	600	0	800	1,600	900	700	7
8	5 to 9	26,700	28,100	25,900	0	0	0	200	1,400	600	0	8
9	10 to 19	20,900	20,500	19,200	0	500	0	100	700	0	0	9
10	20 to 49	19,000	19,300	18,900	0	0	0	0	400	0	0	10
11	50 or more	21,800	20,700	19,900	0	0	0	0	200	200	400	11
12	Mobile Home/Trailer	2,300	2,800	2,800	0	0	0	0	0	0	0	12
	<b>Year Built</b>											
15	1990-1996	22,900	22,200	22,200	0	0	0	0	0	0	0	15
16	1985-1989	37,600	38,100	37,800	0	100	0	0	100	0	100	16
17	1980-1984	18,900	19,600	19,600	0	0	0	0	0	0	0	17
18	1970-1979	82,700	79,200	77,600	0	100	0	200	200	500	500	18
19	1960-1969	80,900	82,500	81,100	0	0	0	0	1,100	0	300	19
20	1950-1959	81,100	80,700	78,500	0	500	0	0	700	500	600	20
21	1940-1949	46,900	46,800	44,800	0	0	0	100	1,100	500	300	21
22	1930-1939	22,100	21,900	21,200	0	0	0	200	100	100	200	22
23	1920-1929	27,400	28,900	27,900	0	0	0	200	500	200	100	23
24	1919 or earlier	59,500	60,300	56,800	0	400	0	1,100	1,600	400	100	24

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**Forward-Looking Table 1 (continued): Structural and Location Characteristics – All Housing Units**

	A	B	C	D	E	F	G	H	I	J	K	
	Characteristics	Published Numbers	Present in 95	95 units present in 2004	Changed in characteristics	95 units affected by conversion /merger	95 mobile homes moved out	95 units changed to nonresidential use	95 units lost through demolition or disaster	95 units badly damaged or condemned	95 units lost in other ways	
	<b>Rooms</b>											
25	1 – 4 rooms	146,400	145,300	116,600	22,400	700	0	900	2,600	800	1,200	25
26	5 rooms	94,700	95,000	48,800	42,900	200	0	200	1,800	800	200	26
27	6 rooms	90,200	91,000	43,900	45,400	100	0	300	600	400	200	27
28	7 rooms	70,100	69,800	30,500	38,400	0	0	300	100	100	300	28
29	8 rooms	47,400	47,400	19,900	26,900	0	0	0	300	0	200	29
30	9 rooms	17,700	18,600	5,800	12,900	0	0	0	0	0	0	30
31	10 rooms or more	13,900	13,200	6,100	7,100	0	0	0	0	0	0	31
	<b>Bedrooms</b>											
32	None	5,600	5,800	1,600	3,900	0	0	200	0	100	0	32
33	1	70,700	69,800	52,600	14,200	100	0	100	1,400	200	1,100	33
34	2	149,500	149,300	110,600	34,200	700	0	800	2,200	600	200	34
35	3	177,500	177,900	140,200	34,600	200	0	300	1,200	1,100	300	35
36	4 or more	77,000	77,300	61,200	14,500	0	0	400	600	100	600	36
37	<b>Multiunit Structures</b>	175,400	174,700	165,300	0	1,100	0	1,200	4,400	1,800	1,100	37
	<b>Stories in Structures</b>											
38	1	NA	5,600	5,400	0	0	0	0	200	0	0	38
39	2	NA	20,200	19,400	0	0	0	0	800	0	0	39
40	3	NA	77,300	73,300	0	600	0	500	1,500	800	600	40
41	4 to 6	NA	71,600	67,200	0	500	0	700	1,800	900	500	41
42	7 or more	NA	0	0	0	0	0	0	0	0	0	42
	<b>Metro Status</b>											
43	In central cities	NA	55,000	50,300	0	600	0	500	2,100	900	600	43
44	In suburbs	NA	425,200	417,100	0	500	0	1,400	3,300	1,200	1,700	44
	<b>Mover Status</b>											
45	Moved in last 2 years	NA	75,400	19,500	53,200	100	0	600	1,200	200	500	45
46	Not a Recent Mover	NA	364,600	357,800	0	700	0	800	3,100	1,300	900	46

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**Forward-Looking Table 2: Condition of Unit – All Occupied Units**

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	<b>Occupied Units</b>	440,000	440,000	403,800	26,800	800	0	1,400	4,200	1,500	1,400	1
	<b>Kitchen</b>											
2	With complete kitchen	434,900	435,000	390,300	35,900	600	0	1,300	4,100	1,500	1,300	2
3	Lacking complete kitchen facilities	5,100	5,000	400	4,000	200	0	100	100	0	100	3
	<b>Plumbing</b>											
4	With all plumbing facilities	437,400	437,300	396,800	31,200	800	0	1,400	4,200	1,500	1,400	4
5	Lack some plumbing	0	2,700	100	2,500	0	0	0	0	0	0	5
6	No hot piped water	0	300	100	100	0	0	0	0	0	0	6
7	No bathtub/shower	0	300	100	100	0	0	0	0	0	0	7
8	No flush toilet	2,600	2,700	100	2,500	0	0	0	0	0	0	8
	<b>Water</b>											
10	Public/private water	349,700	342,300	305,500	29,000	800	0	1,400	3,700	1,300	600	10
11	Well	89,500	96,800	85,000	10,200	0	0	0	600	200	800	11
12	Other water source	800	900	300	700	0	0	0	0	0	0	12
	<b>Sewer</b>											
13	Public sewer	337,400	332,400	297,100	27,400	700	0	1,400	3,700	1,400	700	13
14	Septic tank/cesspool	102,600	107,600	92,300	13,800	100	0	0	600	100	700	14
15	Other or none	0	0	0	0	0	0	0	0	0	0	15
	<b>Severe Problems</b>											
16	<b>Severe Problems</b>	5,400	5,200	100	4,800	0	0	0	200	0	0	16
17	Plumbing	2,600	2,700	100	2,500	0	0	0	0	0	0	17
18	Heating	2,000	2,400	0	2,100	0	0	0	200	0	0	18
19	Electric	100	100	0	100	0	0	0	0	0	0	19
20	Upkeep	700	0	0	0	0	0	0	0	0	0	20
21	Hallways	0	0	0	0	0	0	0	0	0	0	21
	<b>Moderate problems</b>											
22	<b>Moderate problems</b>	13,900	12,800	1,300	9,800	500	0	200	600	100	200	22
23	Plumbing	1,300	1,800	0	1,100	200	0	0	400	100	0	23
24	Heating	200	300	100	100	0	0	0	0	0	0	24
25	Kitchen	4,700	5,000	400	4,000	200	0	100	100	0	100	25
26	Upkeep	8,100	7,500	500	6,000	200	0	0	500	100	100	26
27	Hallways	1,100	500	0	300	100	0	100	0	0	0	27

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**Forward-Looking Table 3: Household Characteristics – All Occupied Units**

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	<b>Occupied units</b>	440,000	440,000	403,800	26,800	800	0	1,400	4,200	1,500	1,400	1
	<b>Age of Householder</b>											
2	Under 65	337,000	333,800	273,700	52,800	800	0	900	3,400	1,100	1,000	2
3	65 or older	102,900	106,200	59,800	44,300	0	0	500	800	500	400	3
	<b>Children</b>											
4	Some	149,200	150,200	82,400	63,600	600	0	500	2,000	600	500	4
5	None	290,800	289,800	210,300	74,300	200	0	900	2,200	900	900	5
	<b>Race/Origin of Householder</b>											
6	White	391,300	393,000	342,000	45,300	200	0	1,300	2,400	900	900	6
7	Hispanic	18,800	20,000	8,000	10,700	0	0	400	600	200	100	7
8	NonHispanic	372,500	373,000	316,600	51,900	200	0	900	1,800	700	800	8
9	Black	35,900	34,300	17,900	13,700	400	0	100	1,200	600	500	9
10	Other	12,800	12,700	2,400	9,300	200	0	0	700	0	0	10
11	Total Hispanics	27,800	29,200	12,700	13,200	400	0	500	1,700	500	200	11
	<b>Income Source</b>											
12	Wages and salaries	338,000	334,700	268,300	61,200	200	0	800	2,600	600	900	12
13	Welfare or SSI	138,700	141,200	77,600	61,000	0	0	500	1,200	500	500	13
14	Social security or pension	26,800	28,200	2,200	22,600	600	0	200	1,800	600	200	14

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Forward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units**

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	<b>Occupied units</b>	440,000	440,000	403,800	26,800	800	0	1,400	4,200	1,500	1,400	1
	<b>Tenure</b>											
2	Owner occupied	290,700	290,700	264,000	24,600	0	0	600	600	100	800	2
3	Percent own occpd	66.1%	66.1%									3
4	Renter occupied	149,300	149,300	105,300	36,700	800	0	800	3,700	1,400	600	4
	<b>Renter Monthly Housing Costs</b>											
5	Less than \$350	23,900	27,700	10,400	13,600	500	0	500	1,800	700	200	5
6	\$350 to \$599	42,000	43,000	10,400	30,800	0	0	100	1,200	400	100	6
7	\$600 to \$799	47,600	45,800	14,200	30,500	200	0	100	500	200	0	7
8	\$800 to \$1,249	24,300	25,100	9,600	15,400	0	0	0	0	100	0	8
9	\$1,250 or more	2,300	400	100	300	0	0	0	0	0	0	9
10	No cash rent	9,100	7,300	1,500	5,100	100	0	100	200	0	200	10
	<b>Renter Hsd Income</b>											
11	Less than \$15,000	44,200	46,000	16,300	25,900	500	0	200	2,200	500	400	11
12	\$15,000 to \$29,999	44,900	44,400	7,600	34,100	200	0	400	1,100	800	200	12
13	\$30,000 to \$49,999	33,600	32,100	6,700	24,900	0	0	100	200	100	0	13
14	\$50,000 to \$99,999	22,800	22,600	4,000	18,200	100	0	100	100	0	0	14
15	\$100,000 or more	3,800	4,200	300	4,000	0	0	0	0	0	0	15
	<b>Owner Monthly Housing Costs</b>											
16	Less than \$350	32,500	33,600	5,100	28,000	0	0	200	100	0	100	16
17	\$350 to \$599	69,000	72,000	24,200	47,500	0	0	0	200	0	100	17
18	\$600 to \$799	28,800	29,100	3,800	24,900	0	0	100	0	100	100	18
19	\$800 to \$1,249	77,000	77,500	25,100	51,700	0	0	0	200	0	300	19
20	\$1,250 or more	83,500	78,500	55,800	22,400	0	0	200	0	0	100	20
	<b>Owner Hsd Income</b>											
21	Less than \$15,000	22,300	22,700	3,800	18,700	0	0	100	0	0	100	21
22	\$15,000 to \$29,999	46,400	46,000	10,800	34,900	0	0	200	0	100	0	22
23	\$30,000 to \$49,999	55,900	56,900	9,500	47,200	0	0	0	0	0	200	23
24	\$50,000 to \$99,999	118,900	120,300	50,000	69,300	0	0	100	500	0	500	24
25	\$100,000 or more	47,200	44,800	25,100	19,500	0	0	100	100	0	0	25

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Backward-Looking Table 1: Structural and Location Characteristics – All Housing Units**

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	<b>Total</b>	495,800	495,900	467,200	0	0	900	25,000	1,800	1,000	1
	<b>Occupancy Status</b>										
2	Occupied	463,000	463,100	407,800	28,800	0	800	23,800	1,100	800	2
3	Vacant	30,600	30,600	6,000	22,500	0	100	1,200	700	100	3
4	Seasonal	2,200	2,200	1,100	1,000	0	0	0	0	100	4
	<b>Units in Structure</b>										
5	1, detached	301,900	302,400	280,700	0	0	500	20,700	200	200	5
6	1, attached	31,900	30,600	27,500	0	0	0	2,800	300	0	6
7	2 to 4	80,300	80,900	78,600	0	0	0	500	1,000	800	7
8	5 to 9	24,300	24,800	24,400	0	0	200	0	100	0	8
9	10 to 19	17,800	17,400	16,900	0	0	0	400	0	0	9
10	20 to 49	18,200	18,000	17,400	0	0	100	300	200	0	10
11	50 or more	18,000	18,100	17,800	0	0	100	200	0	0	11
12	Mobile Home/Trailer	3,500	3,800	3,800	0	0	0	0	0	0	12
	<b>Year Built</b>										
13	2000-2004	17,700	15,300	500	0	0	100	14,700	0	0	13
14	1995-1999	16,700	14,600	5,100	0	0	0	9,500	0	0	14
15	1990-1994	20,800	20,200	19,100	0	0	0	700	200	100	15
16	1985-1989	39,500	39,700	39,400	0	0	0	0	100	200	16
17	1980-1984	21,000	21,000	20,900	0	0	0	0	0	100	17
18	1970-1979	64,800	65,200	64,800	0	0	0	0	100	200	18
19	1960-1969	81,900	83,200	82,900	0	0	200	0	100	0	19
20	1950-1959	79,900	80,800	80,600	0	0	100	0	0	100	20
21	1940-1949	45,500	46,500	46,200	0	0	0	0	200	0	21
22	1930-1939	22,200	22,300	22,200	0	0	0	0	100	0	22
23	1920-1929	29,700	30,300	29,800	0	0	100	0	300	0	23
24	1919 or earlier	56,200	56,800	55,600	0	0	300	0	600	200	24



Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Backward-Looking Table 1 (continued): Structural and Location Characteristics – All Housing Units**

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
	<b>Rooms</b>										
25	1 – 4 rooms	142,200	141,700	114,400	22,400	0	700	3,200	500	400	25
26	5 rooms	89,500	89,100	48,700	38,000	0	0	1,800	500	100	26
27	6 rooms	93,400	93,800	44,100	43,800	0	0	4,900	700	200	27
28	7 rooms	78,100	79,100	31,000	42,000	0	100	5,800	100	100	28
29	8 rooms	47,000	47,400	20,200	24,000	0	0	3,200	0	0	29
30	9 rooms	22,600	22,100	5,900	13,400	0	0	2,700	0	100	30
31	10 rooms or more	23,100	22,800	6,200	13,200	0	100	3,400	0	0	31
	<b>Bedrooms</b>										
32	None	3,100	3,200	1,600	1,500	0	0	100	0	0	32
33	1	64,200	63,500	51,700	10,200	0	200	700	300	300	33
34	2	140,200	140,500	109,700	25,500	0	500	3,900	500	300	34
35	3	191,500	192,300	141,600	38,800	0	0	10,800	900	200	35
36	4 or more	96,900	96,500	62,000	24,500	0	200	9,500	100	100	36
37	<b>Multiunit Structures</b>	158,600	159,100	155,200	0	0	400	1,400	1,300	800	37
	<b>Stories in Structures</b>										
38	1	NA	8,400	8,100	0	0	0	200	0	100	38
39	2	NA	52,700	51,400	0	0	0	600	300	300	39
40	3	NA	69,200	67,400	0	0	200	600	700	300	40
41	4 to 6	NA	22,300	21,900	0	0	200	0	200	0	41
42	7 or more	NA	6,500	6,400	0	0	0	0	100	0	42
	<b>Metro Status</b>										
43	In central cities	NA	51,400	49,500	0	0	200	200	1,300	100	43
44	In suburbs	NA	444,500	417,700	0	0	700	24,700	500	900	44
	<b>Mover Status</b>										
45	Moved in last 2 years	NA	77,600	18,300	52,400	0	100	6,300	100	300	45
46	Not a Recent Mover	NA	385,500	287,500	78,400	0	700	17,400	1,000	500	46

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Backward-Looking Table 2: Condition of Unit – All Occupied Units**

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	<b>Occupied Units</b>	463,000	463,100	407,800	28,800	0	800	23,800	1,100	800	1
	<b>Kitchen</b>										
2	With complete kitchen	452,500	452,100	394,200	31,500	0	800	23,800	1,000	800	2
3	Lacking complete kitchen facilities	10,600	11,000	400	10,500	0	0	0	100	0	3
	<b>Plumbing</b>										
4	With all plumbing facilities	457,700	457,600	400,700	30,600	0	800	23,800	1,100	700	4
5	Lack some plumbing	5,400	5,500	100	5,200	0	0	0	0	100	5
6	No hot piped water	700	700	100	500	0	0	0	0	0	6
7	No bathtub/shower	200	300	100	100	0	0	0	0	0	7
8	No flush toilet	200	300	100	100	0	0	0	0	0	8
9	No exclusive use	4,600	4,800	0	4,700	0	0	0	0	100	9
	<b>Water</b>										
10	Public/private water	369,700	355,600	308,000	31,100	0	600	14,600	1,100	200	10
11	Well	92,500	106,500	86,300	10,300	0	200	9,100	0	600	11
12	Other water source	800	1,000	300	700	0	0	100	0	0	12
	<b>Sewer</b>										
13	Public sewer	353,600	349,900	299,500	34,400	0	600	13,900	1,100	300	13
14	Septic tank/cesspool	109,300	113,100	93,700	8,800	0	200	9,900	0	500	14
15	Other	100	100	0	100	0	0	0	0	0	15
	<b>Severe Problems</b>										
16	<b>Severe Problems</b>	8,800	9,100	100	8,800	0	0	0	0	100	16
17	Plumbing	5,400	5,500	100	5,200	0	0	0	0	100	17
18	Heating	3,500	3,600	0	3,600	0	0	0	0	0	18
19	Electric	100	100	0	100	0	0	0	0	0	19
20	Upkeep	100	100	0	100	0	0	0	0	0	20
21	Hallways	0	0	0	0	0	0	0	0	0	21
	<b>Moderate problems</b>										
22	<b>Moderate problems</b>	17,300	18,200	1,300	16,600	0	0	0	200	0	22
23	Plumbing	1,600	2,100	0	2,100	0	0	0	0	0	23
24	Heating	800	800	100	700	0	0	0	0	0	24
25	Kitchen	9,800	11,000	400	10,500	0	0	0	100	0	25
26	Upkeep	5,000	6,000	500	5,400	0	0	0	100	0	26
27	Hallways	800	1,200	0	1,200	0	0	0	0	0	27

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Backward-Looking Table 3: Household Characteristics – All Occupied Units**

	<b>A</b> Characteristics	<b>B</b> Published Numbers	<b>C</b> Present in 2004	<b>D</b> 04 units present in 95	<b>E</b> Changed in characteristics	<b>G</b> 04 mobile homes moved in	<b>H</b> 04 units derived from nonresidential use	<b>I</b> 04 units added through new construction	<b>J</b> 04 units added from temporary losses	<b>K</b> 04 units added by other means	
1	<b>Occupied units</b>	463,000	463,100	407,800	28,800	0	800	23,800	1,100	800	1
	<b>Age of Householder</b>										
2	Under 65	365,900	363,600	276,200	63,500	0	800	21,300	1,100	700	2
3	65 or older	97,000	99,500	60,400	36,400	0	0	2,500	0	100	3
	<b>Children</b>										
4	Some	162,300	163,700	83,300	66,400	0	300	12,800	300	500	4
5	None	300,800	299,400	212,300	74,500	0	500	10,900	800	300	5
	<b>Race/Origin of Householder</b>										
6	White	406,700	407,300	345,800	37,300	0	800	22,100	500	800	6
7	Hispanic	34,100	34,700	8,000	25,400	0	300	600	300	0	7
8	Non-Hispanic	372,600	372,500	320,300	29,400	0	500	21,500	100	800	8
9	Black	40,200	40,300	17,900	20,900	0	0	900	600	0	9
10	Other	16,200	15,500	3,000	11,700	0	0	800	100	0	10
11	Total Hispanics	39,500	39,900	12,700	25,800	0	300	700	300	0	11
	<b>Income Source</b>										
12	Wages and salaries	370,400	368,900	243,700	101,700	0	600	21,300	1,000	600	12
13	Welfare or SSI	125,600	128,400	78,500	45,700	0	0	3,900	100	100	13
14	Social security or pension	26,300	11,100	2,100	8,800	0	100	0	100	0	14

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Backward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units**

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	<b>Occupied units</b>	463,000	463,100	407,800	28,800	0	800	23,800	1,100	800	1
	<b>Tenure</b>										
2	Owner occupied	321,800	321,800	268,500	29,700	0	300	22,500	600	100	2
3	Percent own occpd	69.5%	69.5%								3
4	Renter occupied	141,300	141,300	104,600	33,800	0	500	1,300	600	700	4
	<b>Renter Monthly Housing Costs</b>										
5	Less than \$350	18,500	19,400	10,300	8,700	0	100	0	100	100	5
6	\$350 to \$599	23,100	24,400	10,300	13,900	0	100	100	0	0	6
7	\$600 to \$799	40,800	40,700	14,100	26,100	0	200	0	300	0	7
8	\$800 to \$1,249	43,400	42,100	9,500	31,800	0	0	400	0	300	8
9	\$1,250 or more	6,400	6,300	100	5,800	0	0	400	0	0	9
10	No cash rent	9,100	8,400	1,500	6,200	0	0	300	100	200	10
	<b>Renter Hsd Income</b>										
11	Less than \$15,000	39,700	40,600	16,200	23,700	0	200	200	200	0	11
12	\$15,000 to \$29,999	30,400	30,500	7,500	22,200	0	100	400	100	200	12
13	\$30,000 to \$49,999	34,500	34,500	6,700	27,500	0	0	0	100	200	13
14	\$50,000 to \$99,999	28,700	28,200	4,000	23,500	0	100	200	100	200	14
15	\$100,000 or more	7,900	7,500	300	6,800	0	0	400	0	0	15
	<b>Owner Monthly Housing Costs</b>										
16	Less than \$350	15,000	17,100	5,200	11,300	0	0	600	0	0	16
17	\$350 to \$599	64,900	58,300	24,600	32,100	0	0	1,600	0	0	17
18	\$600 to \$799	31,200	35,600	3,900	30,100	0	0	1,500	100	0	18
19	\$800 to \$1,249	73,100	68,000	25,600	38,900	0	300	2,600	500	100	19
20	\$1,250 or more	137,500	142,700	56,800	69,800	0	0	16,100	0	0	20
	<b>Owner Hsd Income</b>										
21	Less than \$15,000	19,500	19,500	3,900	15,200	0	0	300	100	0	21
22	\$15,000 to \$29,999	32,200	32,300	11,000	19,700	0	200	1,200	0	100	22
23	\$30,000 to \$49,999	49,500	49,900	9,600	39,000	0	0	1,100	100	0	23
24	\$50,000 to \$99,999	120,300	120,300	50,900	61,900	0	100	7,000	300	0	24
25	\$100,000 or more	100,300	99,900	25,500	61,600	0	0	12,800	0	0	25

## ***Changes in the Hartford Housing Stock: 1996-2004***

Forward-looking Table 5 looks at how losses affected certain portions of the Hartford housing stock. The rows were selected because of their inherent interest or because an examination of losses in all 13 metropolitan areas showed that these categories typically had high loss rates. In most cases, if a category had a high loss rate, then a category with the opposite characteristic would have a low loss rate, e.g., units with 1-4 rooms and units with 10 or more rooms.

**Forward-Looking Table 5: Selected Loss Rates**

Category	Based on Columns in Tables 1-4		
	All Losses 1996-2004 (F+G+H+I+J+K)/C	Permanent Losses (I/C)	Potentially Reversible Losses (F+G+H+J+K)/C
<b>All units<sup>16</sup></b>	2.7%	1.1%	1.5%
Vacant units	7.4%	3.2%	4.2%
Units in structures with 2-4 units	5.3%	1.9%	3.5%
Units in structures with 5-9 units	7.8%	5.0%	2.8%
Mobile homes/trailers	0.0%	0.0%	0.0%
Units built 1930-1939	2.7%	0.5%	2.3%
Units built 1920-1929	3.5%	1.7%	1.7%
Units built in 1919 or earlier	6.0%	2.7%	3.3%
Units with 1-4 rooms	4.3%	1.8%	2.5%
Units with no bedrooms	5.2%	0.0%	5.2%
Units in central cities	8.5%	3.8%	4.7%
Units outside of central city	1.9%	0.8%	1.1%
<b>Occupied units<sup>17</sup></b>	2.1%	1.0%	1.2%
Units with severe problems	3.8%	3.8%	0.0%
Units with moderate problems	12.5%	4.7%	7.8%
Units with a White householder	1.5%	0.6%	0.8%
Units with a Black householder	8.2%	3.5%	4.7%
Units with Hispanic householder	11.3%	5.8%	5.5%
Household receives welfare/SSI	12.1%	6.4%	5.7%
Owner-occupied units	0.7%	0.2%	0.5%
Renter-occupied units	4.9%	2.5%	2.4%
Renter-occupied – monthly housing costs less than \$350	13.4%	6.5%	6.9%
Renter-occupied – household income less than \$15,000	8.3%	4.8%	3.5%

<sup>16</sup> All the rows above “Occupied units” refer to portions of the entire housing stock.

<sup>17</sup> All the rows below “Occupied units” refer to portions of the occupied housing stock.

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

By 2004, 2.7 percent of the units in the 1996 housing stock was no longer part of the housing stock; 1.1 percent were permanent losses—that is, the units had either been demolished or destroyed by fire or natural disasters—while 1.5 percent were lost in ways that could be reversed, such as nonresidential use.

Units that were vacant in 1996 had a loss rate more than twice the overall loss rate. Units in small structures also had higher than average loss rates. Units built prior to 1930 had higher than average loss rates, as did small units. The central city loss rate was 4 times greater than the loss rate in the rest of the metropolitan area.

Among units occupied in 1996, 2.1 percent were lost by 2004. The loss rate was higher for units with physical problems, particularly units with moderate physical problems. The loss rates for units occupied by Black or Hispanic householders were substantially greater than the loss rate of those occupied by White householders. Units with households on welfare or SSI had high loss rates.

The loss rate among rental units was almost 7 times the loss rate among owner-occupied units. Low-cost rental units and rental units occupied by the lowest income households had high loss rates.

Backward-looking Table 5 presents addition rates for selected areas of the Hartford housing stock. The rows were selected because of their inherent interest or because an examination of additions in all 13 metropolitan areas showed that these categories typically had high addition rates. In most cases, if a category had a high addition rate, then a category with the opposite characteristic would have a low addition rate, e.g., units with 10 or more rooms and units with no bedrooms.

Of all the units in the Hartford housing stock in 2004, 5.8 percent were not in the 1996 housing stock. Most of the new units came from new construction; the return to the housing stock of units that were not available in 1996 accounted for less than 1 percent of the total units in 2004.

Single units in attached structures had a much higher than average addition rate. Large units had higher than average addition rates, while units with no bedrooms had a lower than average addition rate. The addition rate among units outside of the central city was almost twice the addition rate of units in the central city.

New construction occurred almost entirely outside of the central city, and newly constructed units were occupied almost entirely by White householders. The addition rates were higher than average for owner-occupied units with monthly housing costs greater than \$1,250, and owner-occupied units with households with income of \$100,000 or more.

**Backward-Looking Table 5: Selected Addition Rates**

Category	Based on Columns in Tables 1-4		
	All Additions (G+H+I+J+K)/C	New Construction I/C	Other Additions G+H+J+K/C
<b>All units</b> <sup>18</sup>	5.8%	5.0%	0.7%
Single-unit, attached structure	10.1%	9.2%	1.0%
Mobile homes/trailers	0.0%	0.0%	0.0%
Units with 9 rooms	12.7%	12.2%	0.5%
Units with 10 or more rooms	15.4%	14.9%	0.4%
Units with no bedrooms	3.1%	3.1%	0.0%
Units in central cities	3.5%	0.4%	3.1%
Units outside of central city	6.0%	5.6%	0.5%
<b>Occupied units</b> <sup>19</sup>	5.7%	5.1%	0.6%
Units with a white householder	5.9%	5.4%	0.5%
Units with a Black householder	3.7%	2.2%	1.5%
Units with Hispanic householder	3.3%	1.8%	1.5%
Owner-occupied units	7.3%	7.0%	0.3%
Renter-occupied units	2.2%	0.9%	1.3%
Renter-occupied – monthly housing costs \$800 to \$1,249	1.7%	1.0%	0.7%
Owner-occupied – monthly housing costs \$1,250 or more	11.3%	11.3%	0.0%
Owner-occupied – household income \$100,000 or more	12.8%	12.8%	0.0%

## ***Rental Market Dynamics***

Tables A and B present the rental market dynamics analysis. Rental market dynamics differs from the analysis in rows 5-10 in the forward-looking and backward-looking tables in two ways. First, rental market dynamics uses categories (rows) based on affordability instead of absolute dollar amount. Affordability is defined relative to local area median income measured at the same time that monthly housing costs are measured. Tables A and B use the following six categories:

- Non-market (either no cash rent or a subsidized rent).
- Extremely low rent (monthly housing costs affordable to renters with incomes less than or equal to 30 percent of local area median income).<sup>20</sup>

<sup>18</sup> All the rows above “Occupied units” refer to portions of the entire housing stock.

<sup>19</sup> All the rows below “Occupied units” refer to portions of the occupied housing stock.

<sup>20</sup> “Affordable” is defined as monthly housing costs less than or equal to 30 percent of the highest income in the category.

Components of Inventory Change and Rental Market Dynamics:  
Hartford 1996–2004

**Table A: Forward-Looking Rental Dynamics Analysis, Counts: 1996-2004**

Affordability Groups	A Total in 1996	B Non- Market in 2004	C Extremel y Low Rent in 2004	D Very Low Rent in 2004	E Low Rent in 2004	F Moderate Rent in 2004	G High, Very High, or Extremely High Rent in 2004	I Owner Occupied in 2004	J Seasonal or Vacant in 2004	K Lost to Stock in 2004
<b>Non-market</b>	39,700	16,200	4,900	6,100	1,200	400	100	3,100	3,500	4,300
<b>Extremely Low Rent</b>	10,000	700	3,100	2,600	100	100	0	800	1,800	800
<b>Very Low Rent</b>	54,500	4,000	6,100	28,300	2,200	1,100	100	3,200	7,400	2,000
<b>Low Rent</b>	25,200	1,100	500	8,900	4,700	2,000	0	4,500	3,500	100
<b>Moderate Rent</b>	18,200	400	700	2,700	2,800	2,900	900	5,900	1,800	100
<b>High, Very High, or Extremely High Rent</b>	1,800	0	0	100	100	0	300	1,100	100	0
<b>Total</b>	149,300	22,400	15,200	48,600	11,100	6,500	1,500	18,600	18,100	7,300

**Table B: Backward-Looking Rental Dynamics Analysis, Counts: 2004-1996**

Affordability Groups	A Total in 2004	B Non- Market in 1996	C Extremel y Low Rent in 1996	D Very Low Rent in 1996	E Low Rent in 1996	F Moderate Rent in 1996	G High, Very High, or Extremely High Rent in 1996	I Owner Occupied in 1996	J Seasonal or Vacant in 1996	K New Construc- -tion	L Other Additions
<b>Non-market</b>	31,900	16,100	700	4,000	1,100	400	0	5,600	3,200	500	300
<b>Extremely Low Rent</b>	19,300	4,800	3,100	6,000	500	700	0	700	3,100	0	500
<b>Very Low Rent</b>	62,400	6,000	2,500	28,100	8,800	2,600	100	5,100	8,300	100	600
<b>Low Rent</b>	15,500	1,200	100	2,100	4,700	2,700	100	2,700	1,500	100	200
<b>Moderate Rent</b>	9,000	400	100	1,100	1,900	2,900	0	1,700	700	100	100
<b>High, Very High, or Extremely High Rent</b>	3,200	100	0	100	0	900	300	500	800	400	0
<b>Total</b>	141,300	28,700	6,500	41,500	17,000	10,300	500	16,200	17,500	1,300	1,700



Components of Inventory Change and Rental Market Dynamics:  
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- Very low rent (monthly housing costs affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income).
- Low rent (monthly housing costs affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income).
- Moderate rent (monthly housing costs affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income).
- High rent, very high rent, or extremely high rent (monthly housing costs affordable to renters with incomes greater than 80 percent of local area median income).<sup>21</sup>

The second difference is that rental market dynamics uses different columns in order to highlight changes in availability and affordability. Columns A through G duplicate the rows so that one can trace how rental units change their affordability status. Columns I and J track movement into or out of the owner-occupied stock or the seasonal or vacant stock, respectively. In Table A, the various types of losses are combined in column K, while, in Table B, new construction is recorded in column K and all other additions in column L.

Table A shows that there were 149,300 rental units in the Hartford metropolitan area in 1996. In 2004, 44,000 of those units were no longer rental; 18,600 were owner-occupied, 18,100 were either vacant or being used seasonally, and 7,300 had been lost to the stock. Taken as a proportion of the units in 1996, movement into owner-occupancy was highest among units in the moderate rent category and the category combining high rent, very high rent, and extremely high rent. Losses to the stock were highest among non-market units and extremely low rent units.

Table B shows there were 141,300 rental units in the Hartford metropolitan area in 2004, of which 36,700 were not rental units in 1996. The new units came from units that had been owner-occupied (16,200), units that had been vacant or in seasonal use (17,500), newly constructed units (1,300), and other additions (1,700). Most of the formerly owner-occupied units went to the non-market and very low rent categories; most of the 1,300 newly constructed units went to the non-market category and the category combining high rent, very high rent, and extremely high rent.

Looking at both tables, we see that the overall number of rental units decreased by 8,000 units. The number of extremely low rent and very low rent units combined grew from approximately 65,000 in 1996 to over 80,000 in 2004.

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<sup>21</sup> Ideally this final category would be two separate categories with a boundary of 120 percent of local area median income. However, the Census Bureau uses top coding of variables to prevent data users from being able to identify specific units. At the metropolitan area level, top coding of the variables used to calculate housing costs results in monthly housing costs never exceeding the 120-percent boundary in one or both years.

Components of Inventory Change and Rental Market Dynamics:  
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Tables A and B paint an interesting picture of the evolution of the rental market in Hartford between 1996 and 2004. Overall, the number of rental units decreased by approximately 5 percent. The totals conceal considerable movement into and out of the rental market. The gross flows sum to over 80,000 units. Tables A and B also show that there was considerable movement by individual units across the affordability categories. The net effect of the gross flows into and out of the rental stock and the movement across affordability categories was a substantial increase in the number of units affordable to the lowest income renters.

## ***Appendix A – Internal and External Checks***

For the CINCH analysis, we performed two tests of internal consistency:

- For each row, we tested whether the sum of possible outcomes (columns D through K) equaled the number of units present in the base year (column C). In every case, exact equality was achieved prior to rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13-24) in Table 1 are a disaggregation of the total stock in row 1. Similarly, rows 6 (Whites), 9 (Blacks), and 10 (Other race) in Table 3 are a disaggregation of row 1 (occupied households). In these cases, there should be equality between the parent row and the sum of the break-out rows for all columns except D and E. The difference between column D in the parent row and the sum of column D for the break-out rows should equal the negative of the difference between column E in the parent row and the sum of column E for the break-out rows. In every case, exact equality was achieved prior to rounding.

Column B provides an external check of how well the CINCH weighting performed. In general, the CINCH estimates are within 5 percent of the AHS published totals, and many of the CINCH estimates are very close to the AHS estimates. Footnote 2 indicates where the CINCH weights or coding used for individual rows does not seem to produce the same results as the published estimates.

## **Appendix B – Weighting**

CINCH separates the AHS samples in 1996 and 2004 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 1996 housing stock but are not part of the 2004 housing stock (LOSSES), and units that are not part of the 1996 housing stock but are part of the 2004 housing stock (ADDITIONS). ADDITIONS are segmented into NEW CONSTRUCTION and RECOVERIES (structures that existed in 1996 but were not in the housing stock).

Because CINCH looks at various subsets of the housing stock, we need to know the characteristics of units and their occupants. Therefore, we can use only those SAMES observations that were interviewed in both years. For the same reason, we can use only those LOSSES that were interviewed in 1996 and those ADDITIONS that were interviewed in 2004.

For the forward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 1996 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted count in 1996 of LOSSES to create weights for interviewed LOSSES. We then adjusted the weights of SAMES and LOSSES to equal the AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 1996.

For the backward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 2004 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted counts in 2004 for NEW CONSTRUCTION and for RECOVERIES to create weights for interviewed NEW CONSTRUCTION and interviewed RECOVERIES. We then adjusted the weights for SAMES, NEW CONSTRUCTION, and RECOVERIES to equal AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 2004.

The logic behind the weighting and the procedures used to create the weights are explained in *Weighting Strategy for 2004 Metropolitan CINCH and Rental Dynamics Analysis*.