

American Housing Survey

Components of Inventory Change: 2007-2009

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Executive Summary

A Components of Inventory Change (CINCH) study explains in physical (bricks and mortar) terms how changes that take place in a housing market come about. This CINCH report uses the American Housing Survey (AHS) to track the national housing stock from 2007 to 2009.

Between 2007 and 2009, the U. S. housing stock grew by 1,909,000 units, but this increase was the net result of even larger outflows (losses) and inflows (additions). Table ES-1 records 6 ways in which the housing stock lost a total of 2,085,000 units and 6 ways in which the housing stock gained a total of 3,795,000 units. The 12 measured flows account for 90 percent of the 1,909,000 change and produce an estimate of the 2009 housing stock that is within 0.2 percent of the official 2009 housing stock. Because the sample weights used in the AHS change between surveys, it is practically impossible to achieve a precise accounting of the change in the housing stock between surveys.

Table ES-1: Changes in U.S. Housing Stock between 2007 and 2009

2007 Housing Stock: Published Estimate	128,203,000
Units Lost by Demolition or Disaster	-491,000
Units Added by New Construction	2,547,000
Units Lost from Mergers or Conversions	-193,000
Units Added by Mergers or Conversions	287,000
House or Mobile Home Moved Out	-411,000
House or Mobile Home Moved In	470,000
Units Lost to Nonresidential Use	-288,000
Units Added from Nonresidential Use	261,000
Units Badly Damaged or Condemned	- 302,000
Units Added from Temporary Losses due to Structural Problems	168,000
Units Lost in Other Ways	-400,000
Units added from other sources	62,000
CINCH estimate of 2009 Housing Stock based on 2007 base	129,913,000
2009 Housing Stock: Published Estimate	130,112,000

Over this period, 491,000 housing units were lost due to fire, natural disasters, and voluntary demolition, while new construction added 2,547,000 new housing units. Merging two or more units into a fewer number of units accounted for 193,000 losses, while splitting of units into two or more units added 287,000 units. Moving mobile homes (and houses) from one location to another produced losses of 411,000, while the same movements produced gains of 470,000 units. The gains include some recently built mobile homes that were placed on lots for the first time. Structures can be used for both residential and nonresidential purposes. During this period, 288,000 units from the 2007 housing stock became nonresidential, while 261,000 units were created from structures that had been nonresidential in 2007. Another 302,000 units from the 2007 stock had been condemned or become uninhabitable by 2009, while rehabilitation reclaimed 168,000 units that were condemned or uninhabitable in 2007. Other unspecified causes led to the loss of 400,000 units and the creation of 62,000 new units.

CINCH analysis also identifies the characteristics of the units that are lost or added.

Overall, 1.6 percent of the 2007 housing stock had been lost by 2009. Loss rates were much higher for smaller units, vacant units, and seasonal units and higher for units built prior to 1920, units with severe physical deficiencies in 2007, and rental units, particularly low-rent units. The 2009 housing stock consisted of units that had been part of the 2007 stock (97.1 percent) and units that had been created since 2007 by new construction or other means (2.9 percent). The rate of new additions from all sources was higher than average among smaller units, units in a structure of four or more stories, single-family attached units, and units used for seasonal purposes. Focusing only on new construction, units in large buildings, units with 10 or more rooms, and single-family attached units had higher than average rates of new construction. Owner-occupied units, particularly those occupied by households with incomes of \$100,000 or more, had both higher than average rates of addition and rates of new construction.¹

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

The overall loss rate varied very little over the three periods; 1.6 percent of the stock was lost between 2003 and 2005 and between 2007 and 2009, while 1.8 percent was lost between 2005 and 2007. There was also very little variation in the types of losses across the three periods. The “units lost in other ways” category includes sample cases categorized as “construction not started”; “under construction, not ready”; and “permit abandoned.” Despite the sharp falloff in new construction between 2007 and 2009, there was no evidence of an increase in the number of sample units that were classified in these ways.

The stock picked up new units at the same rate, 4.1 percent, between 2003 and 2005 and between 2005 and 2007, but the rate of growth slowed sharply between 2007 and 2009 to 2.9 percent. There was a noticeable falloff in the contribution of new construction to the housing stock across the three periods. New construction over the preceding 2 years accounted for 2.9 percent of the 2005 stock, 2.5 percent of the 2007 stock, and 2.0 percent of the 2009 stock. The decline in the new construction additions was partially offset in 2007 from an increase in mobile home move-ins; the impact of mobile home move-ins fell back to 0.4 percent in 2009.

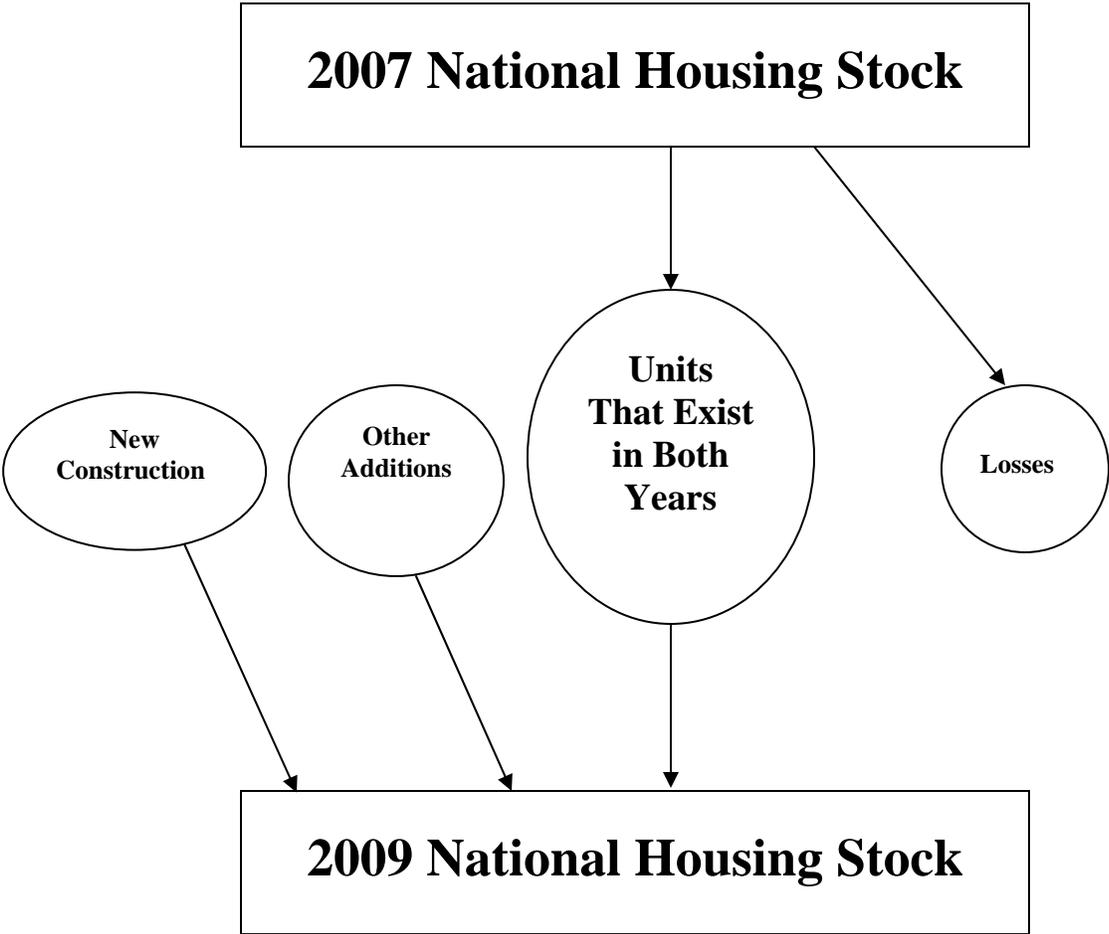
¹ The characteristics discussed in this paragraph had rates that were statistically different from the rates for all units or all occupied units.

Components of Inventory Change: 2007-2009

Overview

Components of Inventory Change (CINCH) is a tool used by housing analysts to study how the housing inventory changes over time. Figure 1 illustrates how the inventory evolves.

Figure 1: How the Housing Inventory Changes



According to the American Housing Survey (AHS), the 2007 housing stock contained 128,203,000 housing units. Most of these units continued to be part of the 2009 housing stock, but some units disappeared from the housing stock between 2007 and 2009. The AHS estimated that the 2009 housing stock contained 130,112,000 housing units. Simple arithmetic shows that new construction and other additions had to provide a sufficient number of units to overcome any losses between 2007 and 2009 and to increase the overall stock by 1,909,000 units. In the context of Figure 1, the U.S. Census Bureau provides estimates for both rectangles (the 2007 and 2009 housing stocks) and one oval (units added through new construction between

2007 and 2009). No one estimates the other three ovals: the number of units that belong to both the 2007 and 2009 housing stock, units lost to the housing stock between 2007 and 2009, and other additions to the housing stock between 2007 and 2009.

While losses and other additions are small relative to the overall stock, they encompass important features of how housing markets evolve. Housing units are “clumps” of physical capital associated with specific plots of land, and the housing inventory is the aggregation of these capital-land combinations. New construction creates new clumps, and like all capital, some “clumps” depreciate and disappear. But housing units undergo other interesting changes. Losses can be either permanent or temporary. Units destroyed by natural disasters or intentionally demolished are permanent losses. Temporary losses include units that are used for nonresidential purposes and units that are uninhabitable because of structural defects that can be repaired. Additions can result from restoring units that were uninhabitable or converting nonresidential structures into residential structures.

In addition to determining the size of each oval, housing analysts find information about the characteristics of the units in the different ovals useful. Interesting characteristics include: structure type, age of the unit, size of the unit, location by region, location by metropolitan status, tenure, household size and composition, resident income, and resident race and ethnicity.

CINCH analysis has three goals:²

- To provide an estimate for all six components of Figure 1.
- To disaggregate losses and other additions into relevant component parts.
- To characterize the units that survive from one period to the next and the units that are added or lost between periods.

The AHS has four features that make CINCH analysis possible:

- Each unit has weights that can be used to estimate its share of the overall stock.
- The AHS tracks new construction and the various types of losses and other additions.
- The AHS has detailed information about the characteristics of each unit and its occupants.
- The AHS tracks the same unit from one period to the next so that changes in status and characteristics can be observed directly.

² Previous CINCH analyses have distinguished between the “status” of a unit with respect to the housing stock, e.g., existing as a nonresidential structure, and the “characteristics” of the unit or its occupants, e.g., rental vs. owner-occupied or the race of the householder. This report will use this same distinction. Also adopting previous CINCH terminology, the report will refer to the more recent AHS survey, 2009, as the current year and the previous AHS survey year, 2007, as the base year.

Weighting Issues Involved in Using the AHS

It would be possible to list for every AHS unit its status and characteristics in both 2007 and 2009. In some cases, there may be no status, e.g., not yet constructed in 2007, or no characteristics, e.g., no race of householder for vacant units, but with this understanding, such a listing would still be possible. From the listing, one could construct an exact accounting of the movement of units among the various statuses and characteristics between 2007 and 2009.

The exact accounting would apply only to AHS sample observations, roughly a 1-in-3,000 picture of the housing stock at the national level. To obtain estimates of the magnitude of actual changes in the housing stock, one needs to apply weights to the sampled units. When weights are applied, the accounting will no longer be exact because units have different weights in different years.³ For example, the exact accounting might show that 2,500 sample units that were rental in 2007 became owner-occupied in 2009. To estimate the number of units in the national housing stock that were rental in 2007 and became owner-occupied in 2009, one would need to apply weights. But using 2007 weights would produce a different estimate than using 2009 weights. There is no conceptual reason to favor the answer using 2007 weights over the answer using 2009 weights. The choice of weights depends upon how the intended analysis will be used.⁴

For this reason, previous CINCH analyses have distinguished between:

(a) *Forward-looking analysis*, that is, starting with the base year stock (2007) and determining the status and characteristics of *those* units in the current year (2009). The goal is to explain what happened to the 128,203,000 units comprising the housing stock in the base year. Forward-looking analysis takes the housing stock as given in the base year and looks at the destination of these units in the current year.

(b) *Backward-looking analysis*, that is, starting from the current year (2009) stock and determining the status and characteristics of *those* units in the base year (2007). The goal here is to explain where the 130,112,000 units comprising the current year housing stock came from. Backward-looking analysis takes the current year housing stock as given and looks at the source of these units, either in the base year or in new construction or other additions.

We will follow the same procedure.

³ The Census Bureau assigns both a pure weight (the inverse of the probability of selection) and a final weight to each AHS observation. The final weights are designed to sum up to independent estimates of the total housing stock. The pure weights will vary over observations within a given AHS because of stratification in drawing the sample. Generally, pure weights do not vary across survey years. However, when HUD and the Census Bureau reduced the AHS sample size in 2007, the pure weight of a given unit in 2007 increased over its 2005 weight because that unit now had to represent more housing units in 2007. The final weights will differ over observations within a given AHS because the Census Bureau makes adjustments for various factors affecting the sample. The final weights of a given observation will vary between AHS surveys because of changes in the housing stock.

⁴ Weighting issues are explained in greater detail in a separate paper, *Weighting Strategy For 2007-2009 CINCH Analysis*.

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 2007 to 2009 and identifying how units were lost to the housing stock, and a set of backward-looking tables tracing where 2009 units came from and distinguishing between units that were part of the stock in 2007 and units that were additions to the stock since 2007.
- A limited discussion of the results in the forward- and backward-looking tables.
- A comparison of the forward-looking and backward-looking results at the level of the overall housing stock to assess the importance of losses, new construction, and other additions in the evolution of the housing stock between 2007 and 2009.

Two appendices explain (a) how the results were tested and (b) how the weights were created. In addition to this report, we have produced a microdata set containing CINCH status and weights for all the AHS observations used. Analysts can link this data set to AHS files to produce custom tabulations. The data set should be available for download from the HUD USER Web site, www.huduser.org.

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 2007 housing stock by 2009. There are three basic dispositions of 2007 units:

- Units that continue to exist in 2009 with the same characteristics (or serving the same market).
- Units that continue to exist in 2009 but with different characteristics (or serving a different market).
- Units that were lost to the stock.

The backward-looking tables are concerned with where the 2009 housing stock came from in reference to 2007. There are three basic sources of 2009 units:

- Units that existed in 2007 with the same characteristics (or serving the same market).
- Units that existed in 2007 but with different characteristics (or serving a different market).
- Units that are additions to the housing stock.

Since the essence of the CINCH analysis is in the columns, we will explain the columns in detail.

Columns Common to Both Forward-Looking and Backward-Looking Tables

The first and last columns contain the row numbers, which 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 A focuses on occupied units; row 17 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 2007 AHS report counted 110,692,000 occupied units in 2007 (column B, row 2, forward-looking Table A); the 2009 AHS report counted 111,806,000 occupied units (column B, row 2, backward-looking Table A).
- 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 (2007 for the forward-looking tables and 2009 for the backward-looking tables), and (b) satisfying the condition in column A. CINCH uses different weights than those used in preparing the published reports. Therefore, CINCH estimates can differ from AHS estimates for particular subsets of the housing stock. As explained in Appendix B, the weights were created to match certain AHS published totals; for this reason, rows 2 through 4 of Table A are perfect matches. This perfect match will not be true for most other rows.⁵
- 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-looking Table A estimates that 100,730,000 of the occupied units in 2007 were also occupied in 2009.
- 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 8,880,000 units that were occupied in 2007 are still part of the housing stock in 2009 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 characteristics are considered impossible or unlikely to change.

⁵ Columns B and C will also match, except for rounding, in row 1 of Table A because row 1 is defined as the sum of rows 2 through 4.

Columns Unique to Forward-Looking Tables

In forward-looking tables, columns F through K track what happened to units that were lost from 2007 to 2009.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2009 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 124,000 units were lost to mergers and conversions (column F, row 2 of forward-looking Table A).
- Column G is the CINCH estimate of the number of houses or mobile homes from column C that were moved out during the period. In most cases, these units were relocated rather than destroyed. The AHS considers them “losses” because a housing unit is a combination of land and capital and a move breaks that specific combination to create a new combination at a different location. For this reason, mobile homes that move from one lot to another are treated as both losses and additions.⁶ Among occupied units, 263,000 units were moved out.
- Column H is the CINCH estimate of the number of units 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.⁷ Among occupied units, 125,000 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 2009. In this case, 227,000 units occupied in 2007 were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2009 were condemned or were no longer usable for housing because of extensive damage. Among occupied units, 130,000 units were no longer usable for housing.
- Column K is the CINCH estimate of the number of units from column C that were lost by 2009 for other reasons. These include unoccupied sites for mobile homes and losses not otherwise classified. Among occupied units, there were 212,000 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.

⁶ The AHS does not track what happens to a house or mobile home that is moved off of a lot that is part of the AHS sample, and does not inquire about the previous history of a unit that is moved on to a lot that is part of the AHS sample.

⁷ 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. Nonresidential, therefore, means strictly no residential use.

Columns Unique to Backward-Looking Tables

In backward-looking tables, columns F through K track where units came from that are part of the housing stock in 2009 but were not part of the 2007 housing stock.

- Column F is the CINCH estimate of the number of units from column C that were created by the merger or conversion of other units. Among occupied units in 2009, 200,000 units were additions to the stock since 2007 that were created by mergers or conversions (column F, row 2 of backward-looking Table A).
- Column G estimates the number of houses or mobile homes from column C that were moved in during the period. Among occupied units, 299,000 houses or mobile homes were moved in. As noted in the discussion of column G for the forward-looking tables, mobile homes that move from one lot to another are treated as both losses and additions.⁸
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 2007. Among occupied units, 159,000 had been nonresidential in 2007.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 2007 and 2009. Among occupied units, 1,923,000 units were newly constructed.
- Column J is the CINCH estimate of the number of units from column C that were added by 2009 from units that were structurally unsound in 2007.⁹ Among occupied units, 57,000 had been temporarily lost to the stock in 2007 for structural reasons.
- Column K is the CINCH estimate of the number of units from column C that were added by 2009 from units that had been temporarily lost to the stock for reasons “not classified” or were newly added by “other” means. Among occupied units, 33,000 were recovered from units temporarily lost in 2007 for unspecified reasons or newly added in 2009 for other reasons.

This report now turns to a discussion of the forward-looking and backward-looking tables. The discussion uses four terms that are defined as follows:¹⁰

- *Loss rate* – the sum of columns F through K in the forward-looking tables divided by column C.

⁸ The reader will notice that, for the overall housing stock (row 1), the number of houses and mobile homes moved out after 2007 is less than the number moved in by 2009. These totals frequently do not agree because of limitations in the sample design and difficulty in distinguishing new mobile homes from move-ins.

⁹ These units had codes that identified them as “occupancy prohibited” or “interior exposed to the elements” in 2007.

¹⁰ These rates are calculated using unrounded numbers. Thus the reported rates may differ from rates computed from the tables in this report.

- *Rate of total additions* – the sum of columns F through K in the backward-looking tables divided by column C. The rate of total additions can be further decomposed into:
 - *New construction rate* – column I in the backward-looking tables divided by column C.
 - *Other additions rate* – the sum of columns F, G, H, J, and K in the backward-looking tables divided by column C.

Forward-Looking Table A: Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristic	B Published numbers	C Present in 2007	D 2007 units present in 2009	E Change in Characteristics	F '07 units lost due to conversion/merger	G '07 house or mobile home moved out	H '07 units changed to nonresidential use	I '07 units lost through demolition or disaster	J '07 units badly damaged or condemned	K '07 units lost in other ways	
1	Total Housing Stock	128,203	128,203	126,119	NA	193	411	288	491	302	400	1
	Occupancy Status											
2	Occupied	110,692	110,692	100,730	8,880	124	263	125	227	130	212	2
3	Vacant	13,109	13,109	5,072	7,299	60	110	91	204	151	122	3
4	Seasonal	4,402	4,402	2,362	1,775	8	38	72	59	21	66	4
	Units in Structure											
5	1, detached	80,406	80,038	79,206	NA	43	38	142	264	170	174	5
6	1, attached	7,135	6,811	6,733	NA	18	0	15	18	5	23	6
7	2 to 4	10,515	10,612	10,339	NA	90	0	30	64	44	45	7
8	5 to 9	6,200	6,146	6,055	NA	5	0	14	20	31	21	8
9	10 to 19	5,808	5,918	5,836	NA	5	0	18	32	17	9	9
10	20 to 49	4,609	4,688	4,573	NA	6	0	41	10	17	40	10
11	50 or more	4,826	5,284	5,186	NA	7	0	28	15	19	30	11
12	Mobile Home/trailer	8,705	8,705	8,189	NA	19	372	0	68	0	57	12
	Year Built											
13	2005-2009	4,882	4,027	3,951	NA	8	38	3	6	0	21	13
14	2000-2004	9,152	10,105	9,983	NA	5	60	17	15	0	24	14
15	1995-1999	8,794	11,341	11,234	NA	5	70	12	8	0	12	15
16	1990-1994	7,028	4,779	4,718	NA	0	29	5	8	0	19	16
17	1985-1989	8,811	8,934	8,858	NA	4	22	8	13	8	21	17
18	1980-1984	7,474	7,506	7,397	NA	11	44	5	9	31	9	18
19	1975-1979	14,404	14,252	13,987	NA	10	30	61	62	24	78	19
20	1970-1974	10,969	11,042	10,858	NA	16	59	5	57	13	34	20
21	1960-1969	15,292	15,247	15,002	NA	25	34	30	84	22	49	21
22	1950-1959	12,994	12,793	12,610	NA	15	0	28	62	44	33	22
23	1940-1949	7,916	7,817	7,688	NA	18	5	15	40	23	27	23
24	1930-1939	5,993	5,886	5,736	NA	13	11	16	59	36	15	24
25	1920-1929	5,357	5,253	5,132	NA	9	3	28	25	25	30	25
26	1919 or earlier	9,136	9,222	8,965	NA	53	5	54	42	76	27	26

Forward-Looking Table A (continued): Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristic	B Published numbers	C Present in 2007	D 2007 units present in 2009	E Change in Characteristics	F '07 units lost due to conversion/merger	G '07 house or mobile home moved out	H '07 units changed to nonresidential use	I '07 units lost through demolition or disaster	J '07 units badly damaged or condemned	K '07 units lost in other ways	
	Rooms											
27	1 room	689	757	313	341	6	0	20	8	6	63	27
28	2 rooms	1,385	1,363	533	728	0	31	21	19	12	19	28
29	3 rooms	11,050	11,172	7,825	2,985	60	79	41	66	57	59	29
30	4 rooms	23,290	23,356	14,872	7,958	54	133	58	129	76	76	30
31	5 rooms	29,186	29,028	16,092	12,472	27	95	54	136	80	72	31
32	6 rooms	27,146	26,907	13,728	12,862	34	59	47	68	44	66	32
33	7 rooms	17,631	17,667	7,989	9,554	7	8	21	36	18	33	33
34	8 rooms	10,342	10,431	4,613	5,779	2	5	12	12	5	3	34
35	9 rooms	4,459	4,486	1,603	2,864	3	0	3	8	3	3	35
36	10 rooms or more	3,024	3,035	1,466	1,541	0	0	11	11	0	7	36
	Bedrooms											
37	None	1,347	1,383	734	508	6	2	30	17	14	73	37
38	1	14,656	14,711	12,014	2,267	70	88	49	89	61	73	38
39	2	34,507	34,691	28,405	5,581	68	177	81	161	116	102	39
40	3	52,988	52,730	44,486	7,671	34	117	67	155	94	106	40
41	4 or more	24,705	24,688	20,277	4,176	15	27	61	69	17	46	41
42	Multiunit Structures	31,958	32,649	31,990	NA	112	0	132	141	127	146	42
	Stories in Structures											
43	1	NA	3,836	3,762	NA	11	0	20	15	21	7	43
44	2	NA	13,760	13,497	NA	44	0	35	68	54	61	44
45	3	NA	8,426	8,242	NA	53	0	18	44	27	43	45
46	4 to 6	NA	4,365	4,244	NA	4	0	51	12	23	32	46
47	7 or more	NA	2,262	2,245	NA	1	0	7	2	3	4	47
	Region											
48	Northeast	23,128	23,505	23,213	NA	49	29	61	33	51	69	48
49	Midwest	29,202	29,602	29,202	NA	58	51	34	110	76	71	49
50	South	48,324	48,881	47,783	NA	48	280	156	287	155	171	50
51	West	27,550	26,214	25,920	NA	38	50	37	60	20	88	51

Forward-Looking Table A (continued): Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristic	B Published numbers	C Present in 2007	D 2007 units present in 2009	E Change in Characteristics	F '07 units lost due to conversion/merger	G '07 house or mobile home moved out	H '07 units changed to nonresidential use	I '07 units lost through demolition or disaster	J '07 units badly damaged or condemned	K '07 units lost in other ways	
	Metro Status											
52	Inside metro area	94,847	95,916	94,499	NA	157	230	221	322	219	267	52
53	In central cities	35,906	36,122	35,494	NA	77	48	88	135	139	140	53
54	In suburbs	58,941	59,794	59,005	NA	80	182	133	187	80	128	54
55	Outside metro area	33,356	32,287	31,619	NA	35	180	67	169	83	132	55

Forward-Looking Table B: Condition of Unit – All Occupied Units (counts in thousands)

	A Characteristic	B Published numbers	C Present in 2007	D 2007 units present in 2009	E Change in Characteristics	F '07 units lost due to conversion/merger	G '07 house or mobile home moved out	H '07 units changed to nonresidential use	I '07 units lost through demolition or disaster	J '07 units badly damaged or condemned	K '07 units lost in other ways	
1	Occupied Units	110,692	110,692	100,730	8,880	124	263	125	227	130	212	1
	Kitchen											
2	With complete	108,967	108,973	98,085	9,870	120	260	112	219	128	178	2
3	Lacking complete	1,725	1,719	182	1,473	4	3	13	8	3	34	3
	Plumbing											
4	With all plumbing	109,433	109,401	98,620	9,746	122	251	122	208	128	204	4
5	Lack some plumbing	1,259	1,291	125	1,119	3	12	3	19	3	8	5
6	No hot piped water	169	174	42	107	0	6	3	14	0	3	6
7	No bathtub/shower	179	174	57	98	0	3	3	8	0	5	7
8	No flush toilet	132	136	54	71	0	0	3	6	0	3	8
9	No exclusive use	1,031	1,035	47	969	3	6	0	5	3	3	9
	Water											
10	Public/private water	97,054	96,102	86,989	8,186	117	226	90	190	120	185	10
11	Well	13,249	14,146	12,921	1,079	8	37	35	32	10	24	11
12	Other water source	389	443	323	112	0	0	0	6	0	3	12
	Sewer											
13	Public sewer	88,723	88,022	78,079	9,113	106	178	93	176	117	160	13
14	Septic tank/cesspool	21,927	22,629	18,927	3,452	19	85	32	49	13	52	14
15	Other	42	41	24	15	0	0	0	3	0	0	15
16	Severe Problems	1,806	1,820	179	1,581	3	12	3	24	8	11	16
17	Plumbing	1,259	1,291	125	1,119	3	12	3	19	3	8	17
18	Heating	463	444	12	416	0	3	0	5	5	3	18
19	Electric	48	47	35	12	0	0	0	0	0	0	19
20	Upkeep	77	71	6	65	0	0	0	0	0	0	20
21	Moderate problems	3,965	3,980	1,182	2,668	9	29	13	27	25	26	21
22	Plumbing	185	207	13	191	0	3	0	0	0	0	22
23	Heating	1,137	1,230	920	267	0	8	0	22	11	3	23
24	Kitchen	1,564	1,719	182	1,473	4	3	13	8	3	34	24
25	Upkeep	1,204	1,297	145	1,092	5	18	3	11	20	3	25

Forward-Looking Table C: Household Characteristics – All Occupied Units (counts in thousands)

	A Characteristic	B Published numbers	C Present in 2007	D 2007 units present in 2009	E Change in Characteristics	F '07 units lost due to conversion/merger	G '07 house or mobile home moved out	H '07 units changed to nonresidential use	I '07 units lost through demolition or disaster	J '07 units badly damaged or condemned	K '07 units lost in other ways	
1	Occupied units	110,692	110,692	100,730	8,880	124	263	125	227	130	212	1
	Age											
2	Under 65	87,828	85,840	74,380	10,550	107	236	90	185	109	182	2
3	65 to 74	11,700	12,596	9,002	3,522	5	16	11	16	10	14	3
4	75 or older	11,165	12,257	9,666	2,490	12	12	24	27	11	16	4
	Children											
5	Some	37,836	37,512	27,418	9,686	51	90	52	73	60	81	5
6	None	72,856	73,180	60,805	11,701	74	173	73	155	70	130	6
	Race/Origin											
7	White	90,413	91,531	81,351	9,402	114	171	98	163	73	159	7
8	Hispanic	11,669	12,141	9,474	2,550	29	9	8	35	13	23	8
9	Non-Hispanic	78,744	79,390	69,966	8,764	84	162	90	128	60	137	9
10	Black	13,856	12,806	9,839	2,729	5	80	19	46	55	33	10
11	Hispanic	419	373	162	209	0	0	0	3	0	0	11
12	Non-Hispanic	13,437	12,433	9,616	2,582	5	80	19	43	55	33	12
13	American Indian, Eskimo, Aleut	891	894	604	273	0	6	0	5	0	6	13
14	Asian	3,869	3,833	2,896	908	5	0	5	8	0	11	14
15	Pacific Islander	288	279	184	90	0	3	3	0	0	0	15
16	Two or more races	1,376	1,349	908	427	0	3	0	5	3	3	16
17	Total Hispanics	12,609	13,037	10,275	2,629	29	12	8	40	16	28	17
	Income Source											
18	Wages and salaries	81,679	80,320	64,975	14,632	91	177	68	151	87	138	18
19	Self-employed	13,292	13,220	5,317	7,790	13	26	17	29	16	11	19
20	Social Security or pension	NA	30,128	22,838	7,045	15	59	33	56	21	61	20
21	Dividend or interest	NA	31,741	15,511	16,103	19	30	18	29	13	18	21
22	Welfare	1,934	1,907	358	1,508	3	9	3	8	16	3	22

Forward-Looking Table D: Tenure, Housing Cost, and Income – All Occupied Units (counts in thousands)

	A Characteristic	B Published numbers	C Present in 2007	D 2007 units present in 2009	E Change in Characteristics	F '07 units lost due to conversion/merger	G '07 house or mobile home moved out	H '07 units changed to nonresidential use	I '07 units lost through demolition or disaster	J '07 units badly damaged or condemned	K '07 units lost in other ways	
1	Occupied units	110,692	110,692	100,730	8,880	124	263	125	227	130	212	1
	Tenure											
2	Owner occupied	75,647	75,647	68,551	6,642	48	124	57	96	40	90	2
3	Percent own	68.3%	68.3%									3
4	Renter occupied	35,045	35,045	27,331	7,086	76	139	68	132	91	122	4
	Renter Costs											
5	Less than \$350	3,379	3,538	1,727	1,741	3	9	3	21	11	24	5
6	\$350 to \$599	6,927	6,990	2,815	4,076	24	9	16	14	22	14	6
7	\$600 to \$799	7,713	7,634	3,210	4,318	16	15	11	21	20	23	7
8	\$800 to \$1,249	9,992	9,980	5,436	4,395	21	9	15	40	24	38	8
9	\$1,250 or more	4,673	4,747	2,732	1,977	4	3	12	8	0	11	9
10	No cash rent	2,361	2,156	656	1,334	8	94	11	27	13	13	10
	Renter Hsd Income											
11	Less than \$15,000	9,171	9,333	4,180	4,925	17	48	21	51	37	54	11
12	\$15,000 to \$29,999	9,187	9,119	2,748	6,204	24	45	26	27	35	11	12
13	\$30,000 to \$49,999	7,697	7,594	2,127	5,350	16	31	3	27	13	27	13
14	\$50,000 to \$99,999	7,150	7,123	2,415	4,622	13	15	13	21	6	17	14
15	\$100,000 or more	1,840	1,876	509	1,338	5	0	5	5	0	13	15
	Owner Costs											
16	Less than \$350	12,881	11,582	5,330	6,086	5	59	4	52	16	30	16
17	\$350 to \$599	12,896	13,003	5,154	7,737	14	28	21	16	8	25	17
18	\$600 to \$799	7,613	7,835	2,183	5,617	11	6	9	0	3	6	18
19	\$800 to \$1,249	14,758	14,606	6,783	7,771	0	11	3	14	8	16	19
20	\$1,250 or more	27,500	28,622	20,847	7,685	19	20	21	13	5	12	20
	Owner Hsd Income											
21	\$0 to \$14,999	6,973	7,159	2,685	4,378	5	28	11	25	11	16	21
22	\$15,000 to \$29,999	11,370	11,593	3,887	7,578	3	38	27	24	11	25	22
23	\$30,000 to \$49,999	13,245	13,174	4,634	8,453	22	18	8	19	5	16	23
24	\$50,000 to \$99,999	25,500	25,307	12,797	12,408	16	40	3	14	10	19	24
25	\$100,000 or more	18,559	18,413	11,301	7,072	3	0	8	13	3	13	25

Backward-Looking Table A: Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2009	D 2009 units present in 2007	E Change in characteristics	F '09 units created by conversion/ merger	G '09 house or mobile home moved in	H '09 units derived from nonresidential use	I '09 units added by new construction	J '09 units added from temp losses	K '09 units added in other ways	
1	Total Housing	130,112	130,112	126,317	NA	287	470	261	2,547	168	62	1
	Occupancy Status											
2	Occupied	111,806	111,806	100,420	8,714	200	299	159	1,923	57	33	2
3	Vacant	13,688	13,688	5,244	7,565	75	94	57	540	92	21	3
4	Seasonal	4,618	4,618	2,484	1,889	12	77	45	84	19	8	4
	Units in Structure											
5	1, detached	82,472	81,718	79,710	NA	105	57	78	1,648	100	21	5
6	1, attached	7,053	6,745	6,384	NA	35	4	19	292	11	0	6
7	2 to 4	10,160	10,446	10,191	NA	71	0	75	80	20	9	7
8	5 to 9	6,347	6,372	6,274	NA	16	0	16	63	0	3	8
9	10 to 19	5,722	5,911	5,784	NA	14	0	4	91	2	16	9
10	20 to 49	4,525	4,690	4,541	NA	9	0	8	127	2	2	10
11	50 or more	5,063	5,459	5,139	NA	36	0	44	222	9	8	11
12	Mobile	8,769	8,770	8,294	NA	0	409	16	23	24	3	12
	Year Built											
13	2005-2009	7,324	6,235	4,082	NA	25	76	10	2,037	5	0	13
14	2000-2004	9,158	10,584	10,076	NA	19	48	6	433	0	3	14
15	1995-1999	8,821	11,353	11,242	NA	21	77	6	3	2	2	15
16	1990-1994	7,060	4,861	4,781	NA	10	57	4	0	8	1	16
17	1985-1989	8,804	8,911	8,845	NA	1	53	5	3	0	3	17
18	1980-1984	7,478	7,748	7,670	NA	13	48	6	4	6	2	18
19	1975-1979	13,731	13,717	13,594	NA	21	44	21	14	20	4	19
20	1970-1974	11,068	10,969	10,861	NA	22	44	22	6	11	2	20
21	1960-1969	15,261	15,119	15,038	NA	20	6	28	10	18	0	21
22	1950-1959	13,222	12,707	12,603	NA	34	11	20	16	17	5	22
23	1940-1949	7,945	7,760	7,678	NA	25	0	29	6	17	5	23
24	1930-1939	5,840	5,772	5,683	NA	25	3	29	2	24	7	24
25	1920-1929	5,164	5,143	5,076	NA	15	0	21	7	15	8	25
26	1919 or earlier	9,235	9,233	9,089	NA	38	2	54	6	26	18	26

Backward-Looking Table A (continued): Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2009	D 2009 units present in 2007	E Change in characteristics	F '09 units created by conversion/ merger	G '09 house or mobile home moved in	H '09 units derived from nonresidential use	I '09 units added by new construction	J '09 units added from temp losses	K '09 units added in other ways	
	Rooms											
27	1 room	579	656	321	279	10	3	21	5	2	14	27
28	2 rooms	1,423	1,379	523	752	25	23	18	25	6	7	28
29	3 rooms	11,290	11,308	7,676	3,283	57	49	46	163	25	8	29
30	4 rooms	23,036	23,247	14,707	7,899	67	153	78	285	49	7	30
31	5 rooms	29,888	29,774	16,151	12,748	46	163	41	576	40	10	31
32	6 rooms	27,480	27,315	13,803	12,900	47	39	21	475	22	9	32
33	7 rooms	17,877	17,775	8,060	9,225	16	26	19	408	18	4	33
34	8 rooms	10,623	10,725	4,646	5,744	6	9	9	302	6	2	34
35	9 rooms	4,629	4,662	1,611	2,883	4	1	5	159	0	0	35
36	10 rooms or more	3,286	3,272	1,476	1,631	10	3	3	149	0	0	36
	Bedrooms											
37	None	1,265	1,295	732	468	16	3	30	23	5	19	37
38	1	14,690	14,699	11,805	2,400	102	75	59	217	27	13	38
39	2	34,514	34,838	28,230	5,714	78	184	92	471	62	7	39
40	3	53,734	53,508	44,782	7,360	58	178	53	1,005	59	12	40
41	4 or more	25,909	25,772	20,475	4,351	33	30	26	831	16	11	41
42	Multiunit Stories in	31,817	32,878	31,929	NA	146	0	148	584	33	38	42
43	1	NA	3,708	3,650	NA	21	0	6	24	6	0	43
44	2	NA	13,441	13,218	NA	36	0	47	121	10	10	44
45	3	NA	8,885	8,630	NA	35	0	38	171	10	2	45
46	4 to 6	NA	4,224	3,997	NA	33	0	36	135	6	17	46
47	7 or more	NA	2,620	2,434	NA	21	0	22	134	0	9	47
	Region											
48	Northeast	23,316	23,914	23,229	NA	124	35	92	393	13	29	48
49	Midwest	29,403	29,998	29,258	NA	38	74	49	528	37	14	49
50	South	49,372	49,575	47,964	NA	60	319	66	1,060	95	12	50
51	West	28,021	26,624	25,867	NA	64	41	54	568	23	6	51

Backward-Looking Table A (continued): Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2009	D 2009 units present in 2007	E Change in characteristics	F '09 units created by conversion/ merger	G '09 house or mobile home moved in	H '09 units derived from nonresidential use	I '09 units added by new construction	J '09 units added from temp losses	K '09 units added in other ways	
	Metro Status											
52	Inside metro area	102,679	97,342	94,486	NA	249	202	203	2,050	98	54	52
53	In central cities	37,604	36,459	35,301	NA	116	9	139	798	57	39	53
54	In suburbs	65,075	60,882	59,185	NA	133	193	63	1,252	40	16	54
55	Outside metro area	27,433	32,770	31,832	NA	38	267	58	497	71	8	55

Backward-Looking Table B: Condition of Unit – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2009	D 2009 units present in 2007	E Change in characteristics	F '09 units created by conversion/ merger	G '09 house or mobile home moved in	H '09 units derived from nonresidential use	I '09 units added by new construction	J '09 units added from temp losses	K '09 units added in other ways	
1	Occupied Units	111,806	111,806	100,420	8,714	200	299	159	1,923	57	33	1
	Kitchen											
2	With complete	110,054	110,088	97,840	9,632	191	293	152	1,909	51	21	2
3	Lacking complete	1,751	1,718	177	1,486	10	6	7	15	5	12	3
	Plumbing											
4	With all plumbing	110,574	110,520	98,336	9,550	193	299	156	1,919	49	18	4
5	Lack some	1,232	1,286	123	1,126	7	0	3	4	8	15	5
6	No hot piped water	113	119	41	63	0	0	0	0	5	10	6
7	No bathtub/shower	113	121	56	55	0	0	0	0	0	10	7
8	No flush toilet	102	102	53	39	0	0	0	0	0	10	8
9	No exclusive use	1,065	1,109	46	1,041	7	0	3	4	2	5	9
	Water											
10	Public/private water	98,027	97,162	86,593	8,211	189	215	154	1,716	51	33	10
11	Well	13,430	14,259	13,005	946	12	84	4	206	2	0	11
12	Other water source	349	385	324	56	0	0	0	2	3	0	12
	Sewer											
13	Public sewer	89,467	89,221	77,623	9,509	176	91	150	1,587	51	33	13
14	Septic tank/cesspool	22,307	22,558	19,062	2,913	24	208	9	336	5	0	14
15	Other	31	27	24	3	0	0	0	0	0	0	15
16	Severe Problems	1,864	1,903	177	1,679	8	5	3	10	8	15	16
17	Plumbing	1,232	1,286	123	1,126	7	0	3	4	8	15	17
18	Heating	545	541	12	523	1	5	0	1	0	0	18
19	Electric	71	64	35	19	2	0	0	5	2	0	19
20	Upkeep	74	75	6	66	0	0	0	0	3	0	20
21	Moderate problems	3,893	3,845	1,173	2,621	11	7	7	25	0	2	21
22	Plumbing	164	191	13	178	0	1	0	0	0	0	22
23	Heating	1,073	1,123	917	198	0	0	0	8	0	0	23
24	Kitchen	1,629	1,718	177	1,486	10	6	7	15	5	12	24
25	Upkeep	1,177	1,245	144	1,094	1	4	0	3	0	0	25

Backward-Looking Table C: Household Characteristics – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2009	D 2009 units present in 2007	E Change in characteristics	F '09 units created by conversion/ merger	G '09 house or mobile home moved in	H '09 units derived from nonresidential use	I '09 units added by new construction	J '09 units added from temp losses	K '09 units added in other ways	
1	Occupied units	111,806	111,806	100,420	8,714	200	299	159	1,923	57	33	1
	Age											
2	Under 65	88,711	86,060	74,051	9,655	149	258	134	1,734	52	27	2
3	65 to 74	11,938	13,135	9,037	3,899	29	27	15	123	3	4	3
4	75 or older	11,157	12,611	9,665	2,827	22	14	10	67	3	2	4
	Children											
5	Some	38,201	37,119	27,347	8,725	63	105	37	808	25	7	5
6	None	73,604	74,687	60,692	12,371	137	194	121	1,115	32	26	6
	Race/Origin											
7	White	91,137	92,222	81,274	8,822	145	267	109	1,540	41	23	7
8	Hispanic	11,804	12,543	9,394	2,851	49	28	25	183	10	2	8
9	Non-Hispanic	79,333	79,679	70,010	7,842	96	239	85	1,357	31	21	9
10	Black	13,993	12,898	9,748	2,812	38	27	36	219	13	5	10
11	Hispanic	384	341	159	173	0	0	0	9	0	0	11
12	Non-Hispanic	13,609	12,557	9,529	2,699	38	27	36	210	13	5	12
13	American Indian, Eskimo, Aleut	968	946	600	327	0	3	1	14	0	0	13
14	Asian	4,003	4,008	2,880	967	16	0	12	130	3	0	14
15	Pacific Islander	281	287	182	93	0	0	0	10	0	2	15
16	Two or more races	1,423	1,445	905	522	1	3	0	10	0	2	16
17	Total Hispanics	12,739	13,446	10,184	2,949	49	28	26	197	10	2	17
	Income Source											
18	Wages and salaries	82,121	80,255	64,799	13,338	125	221	111	1,613	30	20	18
19	Self-employed	12,966	12,691	5,338	7,019	14	28	21	257	10	5	19
20	Social Security or pension	NA	30,907	22,890	7,595	58	71	18	254	13	8	20
21	Dividend or interest	NA	30,676	15,585	14,310	44	48	25	651	5	7	21
22	Welfare	2,049	2,014	349	1,627	6	15	5	9	3	0	22

Backward-Looking Table D: Tenure, Housing Cost, and Income – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2009	D 2009 units present in 2007	E Change in characteristics	F '09 units created by conversion/ merger	G '09 house or mobile home moved in	H '09 units derived from nonresidential use	I '09 units added by new construction	J '09 units added from temp losses	K '09 units added in other ways	
1	Occupied units	111,806	111,806	100,420	8,714	200	299	159	1,923	57	33	1
	Tenure											
2	Owner occupied	76,428	76,428	69,196	5,335	76	246	49	1,493	28	5	2
3	Percent owned	68.4%	68.4%									3
4	Renter occupied	35,378	35,378	26,436	8,167	124	53	110	430	29	28	4
	Renter Costs											
5	Less than \$350	2,938	3,162	1,671	1,434	15	0	17	24	0	2	5
6	\$350 to \$599	5,857	5,928	2,723	3,081	26	12	21	46	11	7	6
7	\$600 to \$799	7,517	7,328	3,104	4,142	19	14	6	37	0	6	7
8	\$800 to \$1,249	10,837	10,933	5,257	5,407	34	17	29	171	12	5	8
9	\$1,250 or more	6,192	6,264	2,642	3,429	18	1	25	141	2	7	9
10	No cash rent	2,037	1,763	635	1,078	13	8	12	13	3	0	10
	Renter Hsd Income											
11	Less than \$15,000	9,284	9,278	4,044	5,036	38	21	38	79	8	15	11
12	\$15,000 to \$29,999	8,921	8,978	2,658	6,140	35	5	35	89	10	6	12
13	\$30,000 to \$49,999	7,915	7,822	2,057	5,613	22	24	17	78	10	0	13
14	\$50,000 to \$99,999	7,234	7,240	2,335	4,730	20	3	16	127	1	7	14
15	\$100,000 or more	2,024	2,060	492	1,499	8	0	4	57	0	0	15
	Owner Costs											
16	Less than \$350	10,976	9,730	5,416	4,108	13	105	0	83	5	0	16
17	\$350 to \$599	12,747	12,741	5,200	7,369	2	61	10	96	3	0	17
18	\$600 to \$799	7,331	7,710	2,206	5,396	12	16	6	66	8	0	18
19	\$800 to \$1,249	15,295	15,220	6,840	8,114	11	27	12	209	8	0	19
20	\$1,250 or more	30,078	31,026	21,008	8,873	38	37	21	1,039	5	5	20
	Owner Hsd Income											
21	Less than \$15,000	7,211	7,391	2,719	4,533	17	37	10	69	5	0	21
22	\$15,000 to \$29,999	10,740	10,995	3,931	6,850	12	70	8	114	8	3	22
23	\$30,000 to \$49,999	13,934	14,069	4,686	9,139	10	46	7	170	10	0	23
24	\$50,000 to \$99,999	25,272	24,850	12,906	11,265	24	74	10	570	3	0	24
25	\$100,000 or more	19,271	19,124	11,389	7,114	12	20	15	570	12	3	25

Discussion of CINCH Results

Housing Market Changes in the Turbulent Times

Analysts talk about the financial crisis of 2007-2009. Troubles with subprime and non-traditional mortgage products began as early as 2006 and grew in volume and spread to other financial markets. The first of several crescendos broke on July 31, 2007, when two of Bear Stearns’s hedge funds filed for bankruptcy. A severe recession followed shortly afterwards. The official dating by the National Bureau of Economic Research places the peak of the previous expansion at December 2007 and the trough of the recession at June 2009.

Table 1: Statistics on the Health of the Housing Market: 2003-2010

	Housing starts (in thousands)	Rental Vacancy rates (structures with 5+ units)	Federal Housing Finance Agency Housing Price Index
2003	1,847.7	11.4%	172.8
2004	1,955.8	11.5%	187.9
2005	2,068.3	10.4%	205.6
2006	1,800.9	9.9%	218.0
2007	1,355.0	10.3%	220.4
2008	905.5	11.2%	206.9
2009	554.0	12.3%	197.3
2010	587.6	11.6%*	192.2**

* Average of data on the four quarters of 2010.

** First three quarters.

The recession seemed to arrive early and stay late in the housing market. Table 1 shows that starts fell significantly in 2006 and continued to plummet, with only a small uptick in 2010. Rental vacancy rates reached 12.3 percent in 2009, the highest rate in the last 40 years. Home prices, as measured by the Federal Housing Finance Agency’s (FHFA) repeat sale index (purchases only), rose sharply from 2003 to 2007 and then declined steadily through 2010 to almost the 2004 level.

One might expect that the drastic economic conditions of the 2007-2009 period would affect the dynamics of the housing market. Row 1 of the forward-looking and backward-looking tables records how the full stock evolved from the base year to the current year. Table 2 presents the numbers from the two row 1s of this report and compares them to the same numbers from the previous two CINCH reports. The 2003-2005 period preceded both the financial crisis and the recession; the 2005-2007 period includes the early part of the financial crisis and the end of the previous economic expansion; and the 2007-2009 period falls squarely in both the financial crisis and the recession.

The overall loss rate varied very little over the three periods; 1.6 percent of the stock was lost between 2003 and 2005 and between 2007 and 2009, while 1.8 percent was lost between 2005 and 2007. There was also very little variation in the impact on the stock of various types of losses across the three periods. The “units lost in other ways” category includes sample cases

categorized as “construction not started”; “under construction, not ready”; and “permit abandoned.” Despite the sharp falloff in new construction discussed in the next paragraph, there was no evidence of an increase in the number of sample units that were classified in these ways.

Table 2: Comparison of Inventory Changes: 2003-2005, 2005-2007, and 2007-2009

	Base year (in thousands)			Percent of base year stock		
	2003	2005	2007	2003	2005	2007
Forward-looking						
Present in base year	120,777	124,376	128,203	100.0%	100.0%	100.0%
Also in current year	118,893	122,094	126,119	98.4%	98.2%	98.4%
units lost due to conversion/merger	146	275	193	0.1%	0.2%	0.2%
house or mobile home moved out	245	405	411	0.2%	0.3%	0.3%
units changed to nonresidential use	278	262	288	0.2%	0.2%	0.2%
units lost through demolition or disaster	399	635	491	0.3%	0.5%	0.4%
units badly damaged or condemned	274	318	302	0.2%	0.3%	0.2%
units lost in other ways	543	387	400	0.4%	0.3%	0.3%
Total lost	1,884	2,282	2,084	1.6%	1.8%	1.6%
	Current year (in thousands)			Percent of current year stock		
	2005	2007	2009	2005	2007	2009
Present in current year	124,376	128,203	130,112	100.0%	100.0%	100.0%
Also present in base year	119,323	123,008	126,317	95.9%	95.9%	97.1%
units added by conversion/merger	43	146	287	0.0%	0.1%	0.2%
house or mobile home moved in	442	840	470	0.4%	0.7%	0.4%
units added from nonresidential use	395	279	261	0.3%	0.2%	0.2%
units added by new construction	3,601	3,250	2,547	2.9%	2.5%	2.0%
units added from temporary losses	572	150	168	0.5%	0.1%	0.1%
units added in other ways		530	62		0.4%	0.0%
Total added	5,053	5,195	3,795	4.1%	4.1%	2.9%

The stock picked up new units at the same rate, 4.1 percent, between 2003 and 2005 and between 2005 and 2007, but the rate of growth slowed sharply between 2007 and 2009 to 2.9 percent. There was a noticeable falloff in the contribution of new construction to the housing stock across the three periods. New construction over the preceding 2 years accounted for 2.9 percent of the 2005 stock, 2.5 percent of the 2007 stock, and 2.0 percent of the 2009 stock. The decline in the new construction additions was partially offset in 2007 from an increase in mobile home move-ins; the impact of mobile home move-ins fell back to 0.4 percent in 2009. Except for “units added in other ways,” there was little period-to-period variation in the contribution from the other types of non-new construction additions. Errors were discovered in the code used for “units added in other ways” in the 2009 AHS, and as a result the contribution from this source was corrected to only 62,000 units. It is possible that similar errors contaminated the 2007 and 2005 analyses.¹¹

¹¹ The units included in this category have 2009 values of 10 (other, specify) for REUAD (reason unit added to sample) or 2007 values of 17 (not specified above) for NOINT (reason for no interview) in 2007. The 2009 AHS recorded REUAD values of 10 for 1,192 sample units, compared to 111 in the 2007 AHS. However, after

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

Sample Sizes

Before looking at specific tables, a few remarks on sample sizes are in order. The forward-looking analysis used 43,540 sample units; the backward-looking analysis used 45,911 sample units. While these are large samples, the results reported in some cells may be based on only a handful of units. Typically each sample unit represents approximately 3,000 units in the housing stock. For the forward-looking analysis, 50 percent of the weights were between 3,020 and 3,054; for the backward-looking analysis, 50 percent of the weights were between 2,923 and 3,022.

CINCH focuses on how the housing stock changes and, in particular, attempts to differentiate among the various ways in which the stock adds or loses units. Overall stock changes are relatively small, generally less than 5 percent for total additions and less than 2 percent for losses. When additions and losses are broken down into their component parts, the number of units added or removed by specific causes can be small. For example, Forward-Looking Table A reports that 8,000 seasonal units were lost through mergers or conversions (row 4, column F). In this example, the 8,000-unit estimate was based on 3 sample cases. The estimate of 264,000 single-family detached units destroyed by fire or natural disasters or otherwise demolished (row 5, column I in Forward-Looking Table A) is based on a more respectable 110 sample cases.

In discussing Tables A through D, we will create additional tables to highlight segments of the housing stock that experienced larger than average losses or gains. In these tables we will focus only on those segments where the rate of loss or gain is at least two standard deviations different than the overall rate of loss or gain from the same cause. The tables report weighted rates of losses or gains, whereas the tests are based on unweighted counts. The two standard deviation criterion is designed to provide only a sense of how important the difference is; it is not intended to be a test of statistical significance because repeated use of the same sample undercuts the usual statistical interpretation of a two standard deviation difference loss or gain because, under these conditions, the two standard deviation test is not meaningful.¹²

Forward-Looking Analysis – Table A

Table A 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. For the housing stock as a whole, the loss rate was

discussions with Census Bureau staff, all 1,192 units were reclassified as sample adjustments and removed from the CINCH analysis.

¹² If there are no sample cases of a particular loss or gain, the two standard deviation test of the difference between two rates of loss or gain collapses to a test of whether the overall loss or gain is different from zero percent.

1.6 percent; that is, on average 16 out of every 1,000 units were lost to the stock between 2007 and 2009. Table A breaks these losses down into six categories:

- 4 out of every 1,000 housing units in 2007 were either destroyed in disasters or demolished by 2009.
- 3 out of every 1,000 housing units (predominately mobile homes) were moved from their 2007 location to a new location.
- Three causes – being split into multiple units (conversion) or merged into fewer units, being converted to nonresidential use, and becoming badly damaged or condemned – each eliminated approximately 2 out of every 1,000 housing units.
- The catch-all “losses in other ways” category accounted for the remaining 3 out of every 1,000 housing units lost.

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 B through D, 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 owner-occupied units, renter-occupied units, vacant units, and seasonal units.¹³ “Occupied units” is the sum of owner-occupied units and renter-occupied units. Column D indicates that vacancy and even seasonal use are conditions that are subject to change. More than the half the 2007 vacant units were not vacant in 2009, and approximately 40 percent of the 2007 seasonal units were not seasonal units in 2009.¹⁴

The remaining rows separate the housing stock by structure type, year built, number of rooms, number of bedrooms, number of stories, region, and central city/suburban/non-metropolitan location. For structure type, year built, number of stories, region, and location, we assume that these characteristics are immutable and, therefore, force the analysis to conclude these characteristics are unchanged.

Among the number of rooms categories, the proportion of units surviving to 2009 that have the same number of rooms in both years (the persistence rate) varied between 36 and 73 percent, a pattern of substantial change similar to that seen in previous CINCH analyses. While alterations can add or combine rooms, it is likely that the extent of change reported here is heavily influenced by variation between surveys in how respondents count rooms. A better sense of the impact of alterations can be seen in the persistence rates among the number of bedrooms categories because bedrooms present fewer definitional issues in counting. Except for the zero-bedroom category, these persistence rates are all around 85 percent.

¹³ These matches were done separately for mobile homes and all other structure types. For this reason, the estimate of mobile homes in row 12 equals the published total, except for rounding.

¹⁴ The AHS classifies units as “seasonal” or “year round” based on their use without reference to any structural characteristics or amenities. For example, the addition of central air conditioning would not transform a ski shack into a year-round unit.

Loss rates vary substantially by unit characteristics. Table 3 presents the 10 highest loss rates by characteristics plus the highest loss rates in each group of characteristics.¹⁵

¹⁵ Table 3 reports the highest weighted loss rates by structural or location characteristics. Weighted loss rates are reported only if the difference between the unweighted loss rates for that characteristic and the unweighted loss rate for all units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

Table 3: The Highest Loss Rates, 2007 to 2009, by Structural and Location Characteristics

	A	B	C	D	E	F	G	H
Unit Characteristics	Loss rate	Number lost (in 000s)	Conversions or mergers	Move outs	Nonresidential use	Demolition or disaster	Badly damaged or condemned	Other causes
One-room units	13.6%	103	5.8%	0.0%	19.6%	7.5%	6.0%	61.1%
Zero-bedroom units	10.2%	141	4.2%	1.4%	21.0%	12.0%	9.6%	51.8%
Two-room units	7.5%	102	0.0%	30.6%	20.5%	18.3%	12.1%	18.6%
Seasonal units	6.0%	265	3.1%	14.2%	27.3%	22.4%	7.9%	25.1%
Mobile Home/trailer	5.9%	516	3.7%	72.2%	0.0%	13.1%	0.0%	11.0%
Vacant units	5.6%	738	8.2%	14.9%	12.3%	27.7%	20.4%	16.5%
Three-room units	3.2%	361	16.5%	21.8%	11.4%	18.1%	15.7%	16.4%
Units in 4 to 6 story structures	2.8%	122	3.2%	0.0%	41.6%	9.9%	19.3%	26.0%
Units built in 1919 or earlier	2.8%	257	20.6%	2.1%	21.1%	16.1%	29.7%	10.4%
Units in the South	2.2%	1,098	4.3%	25.5%	14.3%	26.2%	14.1%	15.6%
Units outside metro area	2.1%	667	5.3%	27.0%	10.1%	25.3%	12.4%	19.8%
All units	1.6%	2,084	9.3%	19.7%	13.8%	23.6%	14.5%	19.2%

Column A is the percentage of units with a particular characteristic in 2007 that were lost to the stock by 2009, and column B is the number lost in thousands. Columns C through H contain the percentages of units in column B that were lost due to various causes; columns C through H sum to 100 percent.

Small units, seasonal and vacant units, mobile homes, and older units have the highest loss rates. Among all the 2007 one-room units, 13.6 percent were lost to the stock by 2009. Of these 102,000 one-room units, 61.1 percent were lost due to “other” causes; none were lost due to move-outs and only 7.5 percent were demolished or destroyed. Vacant units had a higher loss rate than occupied units, 5.6 percent to 1.0 percent, suggesting that vacancy may be a stage prior to becoming lost through physical deterioration or destruction. Damage, condemnation, demolition, and destruction accounted for 48.1 percent of the losses among vacant units, compared to 38.0 percent for all units.

As in the 2005-2007 CINCH, units in the South and units outside metropolitan areas had the highest lost rates by location, 2.2 percent and 2.1 percent, respectively. A three-room mobile home in the rural South that is used for seasonal purposes will appear among the tabulations in five rows of Table 3. For this reason, the rows sum to more than twice the number of units lost from the total stock, even though the rows do not exhaust all unit characteristics.

Loss rates showed little variation by year built, but there is a tendency for the pre-1940 categories to have higher loss rates. The lowest loss rate by year built was 0.9 percent for units built in the 1995-1999 period, and the highest was 2.8 percent for units built prior to 1920. Smaller units had much higher loss rates than larger units. The loss rate among zero-bedroom units was 10.2 percent, compared to 1.0 percent among units with four or more bedrooms. The catch-all “other” category accounts for 60 percent of the losses among one-room structures and 50 percent of the losses among one-bedroom units; this compares to only 19 percent for all units. The distribution of losses among types for larger units – whether measured by number of rooms or number of bedrooms – is similar to those for all units.

Among multiunit structures, loss rates are smallest (0.8 percent) among units in buildings with seven or more stories but largest (2.8 percent) among the next tallest class, units in buildings with four to six floors. For both building heights, conversion to nonresidential use was the most common loss. Loss rates are highest in the South and in non-metropolitan areas

The rate of loss *by type of loss* also varies substantially by unit characteristics.¹⁶ Table 4 presents the five largest cause-specific loss rates for each of the six possible reasons a 2007 unit was lost to the stock by 2009. Among units in 2 to 4-unit structures, 8 out of every 1,000 such units in 2007 were lost to the stock due to conversion (splitting) or merging by 2009. This compares to 2 out of 1,000 for all 2007 units. Table 4 lists six different characteristics under cause-specific loss rate for “units lost due to conversion/merger” and eight under “mobile home moved out” because of ties.

¹⁶ Table 4 reports weighted cause-specific loss rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all units has a t-statistic of 2.0 or higher.

Table 4: Top Five Cause-Specific Loss Rates by Structural and Location Characteristics

'07 units lost due to conversion/merger		'07 house or mobile home moved out		'07 units changed to nonresidential use	
Units in 2 to 4-unit structures	0.8%	Mobile homes/trailers	4.3%	Units in 1-room structures	2.7%
Units in 3-story structures	0.6%	Units in 2-room structures	2.3%	No bedroom units	2.1%
Units built 1919 or earlier	0.6%	Units built: 2005-2009	0.9%	Seasonal units	1.6%
Three-room	0.5%	Vacant units	0.8%	Units in 2-room structures	1.5%
One-bedroom units	0.5%	Units built: 1980-1984	0.6%	Units in 4 to 6-story structures	1.2%
Vacant units	0.5%	Units in the South	0.6%	All units	0.2%
All units	0.2%	Units in 4-room structures	0.6%		
		Units outside metro area	0.6%		
		All units	0.3%		
'07 units lost through demolition or disaster		'07 units badly damaged or condemned		'07 units lost in other ways	
Vacant units	1.6%	Vacant units	1.1%	Units in 1-room structures	8.3%
Units in 2-room structures	1.4%	No bedroom units	1.0%	No bedroom units	5.3%
Seasonal units	1.3%	Units built 1919 or earlier	0.8%	Seasonal units	1.5%
Units built: 1930-1939	1.0%	Units in 1-room structures	0.8%	Units in 2-room structures	1.4%
Mobile Homes/trailers	0.8%	Units built: 1930-1939	0.6%	Vacant units	0.9%
All units	0.4%	All units	0.2%	Units in 20 to 49-unit structures	0.9%
				All units	0.3%

As expected, mobile homes had the highest loss rate due to move-outs. Units in two-unit structures, which undoubtedly include many mobile homes, had the second highest rate. Small units and seasonal units had high loss rates due to conversion to nonresidential use. Units in four to six-story structures also had higher than normal loss rates due to conversion to nonresidential use.

The highest loss rates due to fires, natural disasters, and demolitions were found among vacant units, units in two-room structures, and seasonal units. Units built in the 1930-1939 period and mobile homes also had demolition loss rates more than twice the rate for all units. Losses due to severe damage or condemnation were also high for vacant units, small units, and older units. As noted earlier, losses due to other causes were exceptionally high for the very smallest units, those with one room or no bedrooms; they were also high for seasonal and vacant units.

Forward-Looking Analysis – Table B

Table B looks at the physical quality of housing units. Row 1 in Table B repeats row 2, occupied units, from Table A; all the subsequent rows are subsets of row 1. There are important interactions among the rows. Rows 6 through 9 identify specific plumbing problems that result in a unit being classified as “lacking complete plumbing” (row 5). Row 17 (severe plumbing problems) has the same definition as row 5, and a unit reported with a severe plumbing problem will, by definition, have a severe physical problem (row 16).

The housing stock in the United States has a low percentage of units with serious problems. In 2007 only 1.6 percent of the stock lacked a complete kitchen, only 1.2 percent lacked complete plumbing facilities for the exclusive use of tenants, and only 1.6 percent had a severe physical problem of any kind.¹⁷ Physical problems, when they exist, are not persistent. In 2009, 86 percent of units that were without complete kitchens in 2007 had complete kitchens; another 4 percent had left the stock, leaving only 11 percent without complete kitchens for the second survey. In 2009, 87 percent of the units without complete plumbing in 2007 had completed plumbing; another 4 percent had left the stock, leaving only 10 percent with the same failing in 2009. Among units with severe physical problems in 2007, 87 percent did not have severe physical problems in 2009; another 3 percent had left the stock, leaving 10 percent with severe physical problems in both surveys.

Moderate physical problems were more pervasive and more persistent. In 2007, 3.6 percent of housing units had some type of moderate physical problem. Among these units, 30 percent still had a moderate problem in 2009, although not necessarily the same problem. Heating problems were the most persistent moderate physical problem—75 percent of the units with a moderate heating problem in 2007 still had a moderate heating problem in 2009.

¹⁷ 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 4-9 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, all for the exclusive use of the occupants. Rows 16-25 look at units with severe or moderate physical problems. For definitions of severe and moderate problems see pages 1,043 and 1,044 of the AHS Codebook at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf. Changes to the questionnaire in 2009 eliminated the questions needed to access the adequacy of hallways.

Table 5 shows that units with problems had higher loss rates.¹⁸ The loss rate for occupied units was 1.0 percent, whereas the loss rate was 3.3 percent among units with either severe physical problems or moderate physical problems. In 2007, no more than 0.2 percent of units lacked hot piped water, a bathtub or shower, or a flush toilet, but units with these deficiencies had very high loss rates, ranging from 8 to 14 percent. The type of loss varies by condition. Demolitions accounted for 40 percent of the losses among units with severe physical problems but only 21 percent among those with moderate physical problems. Demolitions accounted for 40 to 50 percent of the losses among units that lack hot piped water, a bathtub or shower, or a flush toilet.

Table 6 reports weighted cause-specific loss rates by condition.¹⁹ The generally good quality of the housing stock results in very small sample sizes when one looks at the reasons units were lost, and as a result, only a few of the cause-specific loss rates for specific conditions differed from the cause-specific loss rates for all occupied units by the two standard deviations necessary to qualify for inclusion in this Table. The higher percentage of move-outs among units with septic systems or cesspools probably reflects a higher concentration of mobile homes in rural areas. Units that lack complete kitchen facilities have, by definition, moderate kitchen problems. These units have a higher than average loss rate by conversion to nonresidential use. Units with plumbing problems have high loss rates due to demolition.

¹⁸ Table 5 reports the highest weighted loss rates by condition of unit. Weighted loss rates are reported only if the difference between the unweighted loss rates for that condition and the unweighted loss rate for all occupied units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

¹⁹ Table 6 reports weighted cause-specific loss rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all occupied units has a t-statistic of 2.0 or higher.

Table 5: The Highest Loss Rates, 2007 to 2009, by Condition of Unit

	A	B	C	D	E	F	G	H
Unit Characteristics	Loss rate	Number lost (in 000s)	Conversions or mergers	Move outs	Nonresidential use	Demolition or disaster	Badly damaged or condemned	Other causes
No hot piped water	14.3%	25	0.0%	23.3%	10.8%	55.0%	0.0%	10.8%
No bathtub/shower	10.9%	19	0.0%	14.1%	14.1%	43.5%	0.0%	28.3%
No flush toilet	8.1%	11	0.0%	0.0%	24.5%	51.1%	0.0%	24.5%
Moderate upkeep problems	4.6%	60	8.9%	29.8%	4.5%	18.7%	33.6%	4.5%
Lacking complete kitchen facilities	3.7%	64	8.0%	4.0%	24.0%	12.0%	4.0%	48.0%
Moderate Kitchen	3.7%	64	6.0%	4.2%	20.2%	12.9%	4.2%	52.5%
Lack some plumbing	3.6%	47	5.7%	25.0%	5.7%	40.6%	5.7%	17.2%
Severe plumbing problems	3.6%	47	5.7%	25.0%	5.7%	40.6%	5.7%	17.2%
Moderate heating problems	3.5%	43	0.0%	19.2%	0.0%	50.0%	24.7%	6.2%
Severe problems	3.3%	60	4.4%	19.5%	4.5%	40.5%	13.3%	17.8%
Moderate problems	3.3%	130	7.1%	22.5%	10.0%	20.9%	19.6%	19.8%
Occupied Units	1.0%	1,082	11.5%	24.3%	11.5%	21.0%	12.1%	19.6%

Table 6: Highest Cause-Specific Loss Rates by Condition of Unit

'07 units lost due to conversion/merger		'07 house or mobile home moved out		'07 units changed to nonresidential use	
No conditions satisfied the 2 standard deviation criterion		Moderate problems	0.7%	Lacking complete kitchen facilities	0.8%
Occupied Units	0.1%	Septic tank/cesspool	0.4%	Moderate kitchen problems	0.8%
		Occupied Units	0.2%	Well	0.2%
				Occupied Units	0.1%
'07 units lost through demolition or disaster		'07 units badly damaged or condemned		'07 units lost in other ways	
No hot piped water	7.8%	Moderate upkeep problems	1.5%	Lacking complete kitchen facilities	2.0%
Moderate heating problems	1.8%	Moderate problems	0.6%	Moderate kitchen problems	2.0%
Lack some plumbing	1.5%	Occupied Units	0.1%	Occupied Units	0.2%
Severe plumbing problems	1.5%				
Severe problems	1.3%				
Occupied Units	0.2%				

Forward-Looking Analysis – Table C

Table C pertains to the characteristics of occupants rather than the characteristics of the units. Row 1 repeats row 2, occupied units, from Table A. All the subsequent rows are subsets of row 1 where the loss rate is 1.0 percent for occupied units. Rows 2-4 look at the age of the householder. Rows 5-6 look at whether or not the household includes children. Rows 7-17 look at the race or ethnicity of the householder. Rows 18-22 look at five possible sources of household income.

There was little variation in loss rates across categories defined by the characteristics of the householder or household. The highest loss rate was experienced by units occupied by households receiving welfare, 2.1 percent, while households receiving dividends, interest, and other non-wage income had the lowest loss rate, 0.4 percent. As in previous CINCH studies, an interesting finding is that only 19 percent of the units occupied by households receiving welfare in 2007 were occupied by households receiving welfare in 2009.

The most interesting story with respect to Table C is the absence of a story. Table 7 shows that only three of the demographic categories had loss rates that were two standard deviations higher than the loss rate for all occupied units.²⁰ These three mutually exclusive categories account for only 3 percent of the losses among occupied units. Units with Blacks and non-Hispanic Black householders both had 1.9 percent loss rates that fell just short of the two standard deviation criterion. In Table 8, only the move-outs and losses due to severe damage or condemnation categories have instances where the cause-specific loss rates by demographic characteristics exceeded the all occupied unit rates enough to satisfy the two standard deviation criterion.²¹ Units occupied by welfare recipients and by Black or non-Hispanic Black householders had higher than average losses due to severe damage or condemnation.

²⁰ Table 7 reports the highest weighted loss rates by condition of unit. Weighted loss rates are reported only if the difference between the unweighted loss rates for that condition and the unweighted loss rate for all occupied units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

²¹ Table 8 reports weighted cause-specific loss rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all occupied units has a t-statistic of 2.0 or higher.

Table 7: The Highest Loss Rates, 2007 to 2009, by Characteristics of Occupants

	A	B	C	D	E	F	G	H
Unit Characteristics	Loss rate	Number lost (in 000s)	Conversions or mergers	Move outs	Nonresidential use	Demolition or disaster	Badly damaged or condemned	Other causes
Pacific Islander	2.1%	6	0.0%	53.6%	46.4%	0.0%	0.0%	0.0%
American Indian, Eskimo, Aleut	1.9%	17	0.0%	36.1%	0.0%	31.1%	0.0%	32.7%
Two or more races	1.0%	14	0.0%	21.4%	0.0%	39.3%	19.6%	19.6%
Occupied units	1.0%	1,082	11.5%	24.3%	11.5%	21.0%	12.1%	19.6%

Table 8: The Highest Cause-Specific Loss Rates, 2007 to 2009, by Characteristics of Occupants

'07 units lost due to conversion/merger		'07 house or mobile home moved out		'07 units changed to nonresidential use	
No conditions satisfied the 2 standard deviation criterion		Black Non-Hispanic		0.6%	
Occupied units	0.1%	Black		0.6%	
		Occupied units		0.2%	
'07 units lost through demolition or disaster		'07 units badly damaged or condemned		'07 units lost in other ways	
No conditions satisfied the 2 standard deviation criterion		Welfare		0.8%	
Occupied units	0.2%	Black Non-Hispanic		0.4%	
		Black		0.4%	
		Occupied units		0.1%	

Forward-Looking Analysis – Table D

Table D pertains to tenure, income, and housing costs. Row 1 repeats row 2, occupied units, from Table A. All the subsequent rows are subsets of row 1 where the loss rate is 1.0 percent for occupied units. Rows 2-4 focus on tenure to determine the extent to which units change tenure characteristics and whether rental or owner-occupied units are more likely to be lost. Rows 5-10 classify rental units by total monthly housing costs, while rows 11-15 track rental units by household income.²² Rows 16-20 classify owner-occupied units by total monthly housing costs, while rows 21-25 track owner-occupied units by household income.

Among units that remained in the stock, 91 percent of the units that were owner-occupied in 2007 were owner-occupied in 2009, and 78 percent that were renter-occupied in 2007 were renter-occupied in 2009.

Unlike demographic characteristics, housing costs and household income showed a consistently strong relationship to loss rates. Table 9 lists the categories whose loss rates were more than two standard deviations higher than the loss rate for all occupied units.²³

Rental units had a loss rate of 1.8 percent, compared with 0.8 percent for owner-occupied units. Loss rates were higher for lower cost rental units and rental units occupied by lower income households. In fact, loss rates increased almost monotonically as the housing costs or household income category decreased. The lowest cost owner-occupied units also had higher than average loss rates. There is no discernable pattern in the share of losses accounted for by specific causes.

In Table 10, rental units, particularly low cost rental units or those occupied by low income households, generally have higher cause-specific loss rates for all causes.²⁴ This tendency is more pronounced for units lost because of demolition or severe damage or condemnation. The exception involves losses due to conversion to nonresidential use, a reason for loss where the only category with loss rates higher than that for all occupied units is the category of units occupied by owners with incomes between \$15,000 and \$29,999. The lowest cost owner units appear among the categories with higher than average demolition loss rates.

²² This report contains fewer cost and income categories than the published Census Bureau reports: 6 cost categories compared with 16 in the published reports, and 5 income categories compared with 14 in the published reports. Columns D and E track whether units that exist in both periods serve the same or different types of households in 2007 and 2009. It seemed desirable to track only large changes in the types of households served; that is, putting a unit into column E should represent a substantial change in either housing costs or income. Having fewer categories tends to increase the percent of units that fall into column D (serving the same type of households) and decrease the percent that fall into column E (serving different types of households).

²³ Table 9 reports the highest weighted loss rates by housing costs or household income. Weighted loss rates are reported only if the difference between the unweighted loss rates for that condition and the unweighted loss rate for all occupied units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

²⁴ Table 10 reports weighted cause-specific loss rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all occupied units has a t-statistic of 2.0 or higher.

Table 9: The Highest Loss Rates, 2007 to 2009, by Housing Costs and Household Income

Unit Characteristics	A Loss rate	B Number lost (in 000s)	C Conversions or mergers	D Move outs	E Nonresidential use	F Demolition or disaster	G Badly damaged or condemned	H Other causes
No cash rent	7.7%	166	4.8%	56.4%	6.5%	16.2%	8.1%	8.1%
Renter: Less than \$15,000	2.5%	229	7.4%	21.0%	9.4%	22.4%	16.1%	23.7%
Rental: Less than \$350	2.0%	70	3.8%	12.7%	3.8%	30.6%	15.3%	33.7%
Renter: \$15,000 to \$29,999	1.8%	167	14.4%	26.9%	15.3%	16.0%	21.0%	6.3%
Renter occupied	1.8%	628	12.2%	22.1%	10.8%	21.0%	14.5%	19.5%
Renter: \$30,000 to \$49,999	1.5%	117	14.0%	26.3%	2.3%	23.0%	11.5%	23.0%
Rental: \$800 to \$1,249	1.5%	148	14.3%	6.1%	10.3%	27.1%	16.4%	25.8%
Owner: Less than \$350	1.4%	165	3.2%	35.4%	2.3%	31.4%	9.6%	18.0%
Rental: \$350 to \$599	1.4%	99	24.5%	9.3%	16.2%	13.9%	22.4%	13.7%
Rental: \$600 to \$799	1.4%	106	15.1%	14.2%	10.3%	20.2%	18.9%	21.3%
Occupied units	1.0%	1,082	11.5%	24.3%	11.5%	21.0%	12.1%	19.6%

Table 10: Highest Cause-Specific Loss Rates by Housing Cost or Household Income

'07 units lost due to conversion/merger		'07 house or mobile home moved out		'07 units changed to nonresidential use	
Renter occupied	0.2%	No cash rent	4.3%	Owner: \$15,000 to \$29,999	0.2%
Occupied units	0.1%	Owner: Less than \$350	0.5%	Occupied units	0.1%
		Renter occupied	0.4%		
		Occupied units	0.2%		
'07 units lost through demolition or disaster		'07 units badly damaged or condemned		'07 units lost in other ways	
No cash rent	1.2%	Renter: Less than \$15,000	0.4%	Rental: Less than \$350	0.7%
Renter: Less than \$15,000	0.6%	Renter: \$15,000 to \$29,999	0.4%	Renter: Less than \$15,000	0.6%
Owner: Less than \$350	0.4%	Rental: \$350 to \$599	0.3%	Renter occupied	0.3%
Renter occupied	0.4%	Renter occupied	0.3%	Occupied units	0.2%
Occupied units	0.2%	Occupied units	0.1%		

Backward-Looking Analysis – Table A

Table A 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. Overall, the rate of total additions was 2.9 percent, the new construction rate was 2.0 percent, and the other additions rate was 1.0 percent.

On average, 29 out of every 1,000 units in the 2009 stock were not part of the stock in 2007. Looking at the various ways units could have come into the stock, the 29 new units per 1,000 housing units consist of:

- 20 newly constructed units,
- 4 “houses or mobile homes moved in,”
- 2 units created through a merger or split,
- 2 conversions of nonresidential structures, and
- 1 unit recovered from units with structural deficiencies.

The rate of “additions by other means” was 0.048 percent, less than 1 unit for every 2,000 units.

Persistence patterns as calculated from Backward-Looking Table A closely resemble the persistence patterns reported earlier for Forward-Looking Table A. Occupied units have the higher persistence rate among all the categories where the analysis allows characteristics to vary between surveys; 90 percent of the occupied units in 2009 had also been occupied in 2007. By comparison, only 38 percent of the vacant units in 2009 were also vacant in 2007. Of 2009 seasonal units, 54 percent had been seasonal in 2007.

Table 11 lists the top 10 categories from Table A by the rate of additions; it also includes the South, which had the highest rate of additions among regions.²⁵ The rate of additions in central cities exceeded the rate for all units but not by the required two standard deviations. Column A is the percentage of units with a particular characteristic in 2009 that were added to the stock after 2007, and column B is the number added in thousands. Columns C through H contain the percentages of units in column B that were added by various means; columns C through H sum to 100 percent.

²⁵ Table 11 reports the highest weighted addition rates by structural or location characteristics. Weighted addition rates are reported only if the difference between the unweighted addition rates for that characteristic and the unweighted addition rate for all units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

Table 11: The Highest Additions Rates, 2007 to 2009, by Structural and Location Characteristics

	A	B	C	D	E	F	G	H
Unit Characteristics	Total addition rate	Number added (in thousands)	'09 units added by conversion/merger	'09 house or mobile home moved in	'09 units added from nonresidential use	'09 units added by new construction	'09 units added from temporary losses in 2007 stock	'09 units added in other ways
Unit built: 2005-2009	34.5%	2,153	1.2%	3.5%	0.5%	94.6%	0.2%	0.0%
One-room units	8.4%	55	18.9%	5.2%	38.0%	8.4%	3.6%	25.9%
Two-room units	7.5%	104	23.7%	22.5%	17.2%	23.8%	6.2%	6.6%
Zero-bedroom units	7.3%	95	16.8%	3.0%	31.6%	24.0%	4.9%	19.7%
Units in structures with 7 or more stories	7.1%	186	11.5%	0.0%	11.6%	71.9%	0.0%	5.1%
Vacant	6.4%	879	8.5%	10.7%	6.5%	61.4%	10.5%	2.4%
50 or more units	5.9%	320	11.3%	0.0%	13.8%	69.5%	2.7%	2.6%
Mobile Home/trailer	5.4%	476	0.0%	86.0%	3.4%	4.8%	5.1%	0.7%
Units in structures with 4 to 6 stories	5.4%	227	14.4%	0.0%	16.0%	59.5%	2.7%	7.3%
Single-family, attached	5.4%	361	9.8%	1.1%	5.1%	80.9%	3.0%	0.0%
Seasonal units	5.3%	245	4.9%	31.4%	18.3%	34.5%	7.9%	3.1%
Units in the South	3.3%	1,612	3.7%	19.8%	4.1%	65.8%	5.9%	0.8%
Total Housing Stock	2.9%	3,795	7.6%	12.4%	6.9%	67.1%	4.4%	1.6%

Naturally, units built in the 2005 to 2009 period have the highest rates of total additions. Because the relocation of a mobile home is recorded as both a loss and an addition, one would also expect mobile homes to have high rates of total additions. Table 11 confirms these expectations and shows that small units and units in large or multistoried structures also have high rates of total additions. New construction accounted for less than one-quarter of the additions for small units. As noted in the discussion of Table 3, the categories overlap, so the same unit, for example a two-room mobile home in the South that is used for seasonal purposes, will appear among the tabulations of Table 11 in multiple rows. For this reason, the rows sum to more than twice the number of units added to the total stock, even though the rows do not exhaust all unit characteristics.

Table 12 lists the five highest rates of additions by type of addition.²⁶ Conversion – the splitting of one unit into two or more units – was an important source of additions among small units, and mergers and conversions occurred most frequently among units in multistoried structures. The high rate of move-ins among mobile homes is reflected in the move-in rates reported for seasonal units and units located outside metropolitan areas. Small units also had relatively high rates of additions resulting from the conversion of structures from nonresidential to residential use.

In the 2007 to 2009 period, the rate of new construction was substantially above the overall average for units in structures with 7 or more stories; units in single-family, attached structures; and units with 10 or more rooms. The high rate of new construction among units built in the 2000-2004 period could be the result of response error or could reflect permits drawn late in that period and completed after 2007, that is, permits drawn when the demand for new housing was strong but whose completion was delayed by the adverse shift in market conditions.²⁷

Only 168,000 units were added to the 2009 housing stock from units that had been condemned in 2007 or were open to the elements in 2007. Over half of these (92,000) were vacant in 2009. The rate of additions due to reclaiming lost units was higher in the South and outside of metropolitan areas.

²⁶ Table 12 reports weighted cause-specific addition rates only when the *difference* between the unweighted cause-specific addition rate and the unweighted cause-specific addition rate for all units has a t-statistic of 2.0 or higher.

²⁷ Almost all new construction in Backward-Looking Table A was registered in the 2005 or later year-built category, but some new construction was recorded in every year-built category. We use the variable REUAD to identify new construction and the variable BUILT to classify units by the year in which they were built. The Census Bureau provides the values for REUAD and bases its determination on whether the unit was added to the survey from a sample of building permits; occupants provide the information for BUILT. If a unit was built in 1972 and substantially expanded in 2008, then this unit might show up as new construction if a “new construction” building permit was needed for the expansion while the occupant might answer the BUILT question with 1972.

Table 12: Top Five Cause-Specific Addition Rates by Structural and Location Characteristics

Characteristics	'09 units added by conversion/merger	Characteristics	'09 house or mobile home moved in	Characteristics	'09 units added from nonresidential use
Two-room units	1.8%	Mobile Home/trailers	4.7%	One- room units	3.2%
Zero-bedroom units	1.2%	Seasonal units	1.7%	Zero-bedroom units	2.3%
Units in structures with 7 or more stories	0.8%	Units built: 2005-2009	1.2%	Two-room units	1.3%
Units in structures with 4 to 6 stories	0.8%	Units built: 1990-1994	1.2%	Seasonal units	1.0%
One-bedroom units	0.7%	Units outside metro areas	0.8%	Units in structures with 4 to 6 stories	0.9%
Total Housing Stock	0.2%	Total Housing Stock	0.4%	Total Housing Stock	0.2%
Characteristics	'09 units added by new construction	Characteristics	'09 units added from temporary losses in 2007 stock	Characteristics	'09 units added in other ways
Units built: 2005-2009	32.7%	Vacant units	0.7%	One- room units	2.17%
Units in structures with 7 or more stories	5.1%	Units built: 1930-1939	0.4%	Zero-bedroom units	1.44%
10 or more room units	4.6%	Units outside metro areas	0.2%	Units in structures with 4 to 6 stories	0.40%
Single-family, attached	4.3%	Units in the South	0.2%	Units in structures with 10 to 19 units	0.27%
Units built: 2000-2004	4.1%	Total Housing Stock	0.1%	Units built 1919 or earlier	0.20%
Units in structures with 50 or more units	4.1%			Vacant units	0.15%
Total Housing Stock	2.0%			Total Housing Stock	0.05%

Backward-Looking Analysis – Table B

This table looks at issues related to the physical quality of units. Row 1 repeats row 2, occupied units, from Table A; all the subsequent rows are subsets of row 1.

Backward-Looking Table B indicates that only a small percentage of the 2009 housing stock suffered from serious problems and that serious problems had “persisted” from 2007 to 2009 in only a small percentage of cases. Only 1.5 percent of the 2009 stock lacked a complete kitchen, only 1.2 percent lacked complete plumbing facilities for the exclusive use of tenants, and only 1.7 percent had a severe physical problem of any kind. Only 10.3 percent of units without complete kitchens in 2009 lacked complete kitchens in 2007, only 9.6 percent of the units without complete plumbing for the exclusive use of their tenants in 2009 had the same failing in 2007, and only 9.3 percent of the units with any severe physical problems in 2009 had a severe problem in 2007. Among units with severe problems, those with electrical problems had the highest persistent rates—55.1 percent with a severe electrical problem in 2009 had had a severe electrical problem in 2007. These results confirm the similar findings from Forward-Looking Table A.

In 2009, 3.4 percent of housing units had some type of moderate problem. Among these units, 30.5 percent had had a moderate problem in 2007, although not necessarily the same problem. Heating problems were the most persistent moderate problem—81.7 percent of the units with a moderate heating problem in 2009 had had a moderate heating problem in 2007.

The low incidence of physical problems resulted in small samples of units that were both new to the stock and suffering from these problems. As a result, none of the categories had a rate of new additions that *exceeded* the rate for all occupied units by two standard deviations. For the same reason, there were very few categories where a cause-specific addition rate for a particular problem exceeded the cause-specific addition rate for all occupied units by the required two standard deviations. Table 13 reports those cases.²⁸

Table 13: Highest Cause-Specific Addition Rates by Condition of Unit

Characteristics	'09 house or mobile home moved in
Septic tank/cesspool	0.9%
Well	0.6%
Occupied Units	0.3%
Characteristics	'09 units added in other ways
No flush toilet	9.7%
No hot piped water	8.2%
No bathtub/shower	8.1%
Occupied Units	0.03%

²⁸Table 13 reports weighted cause-specific loss rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all occupied units has a t-statistic of 2.0 or higher.

Mobile homes moves frequently have rural destinations, which accounts for the higher percentage of wells and septic systems among mobile home move-ins. We suspect that the absence of a flush toilet, the absence of hot piped water, and the absence of a bathtub or shower are highly correlated; 65 percent or more of the new units with these problems are additions “in other ways.”²⁹

Backward-Looking Analysis – Table C

This table pertains to the characteristics of occupants. Row 1 repeats row 2, occupied units, from Table A. All the subsequent rows are subsets of row 1 where the rate of total additions was 2.4 percent, the new construction rate was 1.7 percent, and the other additions rate was 0.7 percent. Rows 2-4 look at the age of the householder. Rows 5-6 look at whether or not the household includes children. Rows 7-17 look at the race or ethnicity of the householder. Rows 18-22 look at five possible sources of household income.

Table 14 lists three household characteristics for which the percentages of units occupied by households with those characteristics that were additions to the stock exceeded the percentage of additions among all occupied units.³⁰ The range of variation above the addition rate for all occupied units is lower in Table 14 than in Table 11. Households with Asian householders had the highest rates of new additions, followed by households with some children and households with householders under 65.

The lower variation in addition rates by household characteristics results in fewer instances in which cause-specific addition rates by particular characteristics exceed the cause-specific addition rates for all households. Table 15 lists the fewer instances in which these differences passed the two standard deviation test.³¹

New construction addition rates were highest for households with Asian householders, households with children, households with dividend or interest income or wage or salary income, and households with householders under 65. Households with Black householders, particularly those with non-Hispanic Black householders, had higher than average rates of new additions resulting from the conversion of structures from nonresidential use to residential use. Households with Hispanic or non-Hispanic Black householders account for 23 percent of all households. These households had higher than average rates of addition due to conversions or mergers.

²⁹ To be classified as an additions “in other ways,” a unit had to be classified as a loss to the stock in 2007 for a reason “not classified above” (NOINT = 17).

³⁰ Table 14 reports the highest weighted addition rates by household characteristics. Weighted addition rates are reported only if the difference between the unweighted addition rates for that characteristic and the unweighted addition rate for all occupied units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

³¹ Table 15 reports weighted cause-specific addition rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all occupied units has a t-statistic of 2.0 or higher.

Table 14: The Highest Addition Rates, 2007 to 2009, by Characteristics of Occupants

Characteristics	Total addition rate	Number added (in thousands)	'09 units added by conversion/merger	'09 house or mobile home moved in	'09 units added from nonresidential use	'09 units added by new construction	'09 units added from temporary losses in 2007 stock	'09 units added in other ways
Householder Asian	4.0%	160	10.0%	0.0%	7.4%	81.0%	1.6%	0.0%
Some children	2.8%	1,047	6.0%	10.1%	3.6%	77.2%	2.4%	0.7%
Householder under 65	2.7%	2,354	6.3%	11.0%	5.7%	73.7%	2.2%	1.2%
Occupied units	2.4%	2,671	7.5%	11.2%	5.9%	72.0%	2.1%	1.2%

Table 15: The Highest Cause-Specific Addition Rates, 2007 to 2009, by Characteristics of Occupants

Characteristics	'09 units added by conversion/merger	Characteristics	'09 units added from nonresidential use	Characteristics	'09 units added by new construction
Householder Hispanic White	0.4%	Householder Non-Hispanic Black	0.3%	Householder Asian	3.2%
Householder Hispanic	0.4%	Householder Black	0.3%	Some children	2.2%
Householder Non-Hispanic Black	0.3%	Occupied units	0.1%	Dividend or interest	2.1%
Occupied units	0.2%			Householder under 65	2.0%
				Wages and salaries	2.0%
				Occupied units	1.7%

Backward-Looking Analysis – Table D

Table D pertains to tenure, income, and housing costs. Row 1 repeats row 2, occupied units, from Table A. All the subsequent rows are subsets of row 1 where the rate of total additions was 2.4 percent, the new construction rate was 1.7 percent, and the other additions rate was 0.7 percent.

Rows 2-4 focus on tenure. Rows 5-10 classify rental units by total monthly housing costs, while rows 11-15 track rental units by household income. Rows 16-20 classify owner-occupied units by total monthly housing costs, while rows 21-25 track owner-occupied units by household income.

Owner-occupied units had a higher rate of total additions compared to renter-occupied units, 2.5 percent vs. 2.2 percent, but this difference fails to pass the two standard deviations test. However, the difference in the rates of additions through new construction – 2.0 for owner-occupied housing and 1.2 for renter-occupied housing – does pass the test.

Table 16 lists two household characteristics for which the percentages of units occupied by households with those characteristics that were additions to the stock exceeded the percentage of additions among all occupied units.³² The rates of total addition are highest for the highest cost owner-occupied units and, concomitantly, for the highest income owners. New construction accounts for more than 90 percent of these additions.

Table 17 highlights the differences between owner and rental units in the way that additions occur and how income affects these patterns.³³ Owners, particularly high income owners, have higher than average addition rates through new construction. Renters, particularly low income renters, have higher than average rates of additions through conversions and mergers and through the conversion of units from nonresidential to residential use. Low income owners have higher than average rates of additions due to mobile home move-ins.

³² Table 16 reports the highest weighted addition rates by tenure, housing costs, and household income. Weighted addition rates are reported only if the difference between the unweighted addition rates for that characteristic and the unweighted addition rate for all occupied units has a t-statistic greater than 2.0. The reported percentages in columns C through H may not be statistically different from zero.

³³ Table 17 reports weighted cause-specific addition rates only when the *difference* between the unweighted cause-specific loss rate and the unweighted cause-specific loss rate for all occupied units has a t-statistic of 2.0 or higher.

Table 16: The Highest Addition Rates, 2007 to 2009, by Housing Costs and Household Income

Characteristics	Total addition rate	Number added (in thousands)	'09 units added by conversion/merger	'09 house or mobile home moved in	'09 units added from nonresidential use	'09 units added by new construction	'09 units added from temporary losses in 2007 stock	'09 units added in other ways
Owner: \$1,250 or more	3.7%	1,145	3.3%	3.2%	1.8%	90.8%	0.4%	0.4%
Owner: \$100,000 or more	3.3%	622	2.0%	3.2%	2.4%	91.7%	0.4%	0.4%
Occupied units	2.4%	2,671	7.5%	11.2%	5.9%	72.0%	2.1%	1.2%

Table 17: Highest Cause-Specific Addition Rates by Housing Cost or Household Income

Characteristics	'09 units added by conversion/merger	Characteristics	'09 house or mobile home moved in	Characteristics	'09 units added from nonresidential use
Renter: Less than \$15,000	0.4%	Owner: Less than \$350	1.1%	Rental: Less than \$350	0.5%
Renter: \$15,000 to \$29,999	0.4%	Owner: \$15,000 to \$29,999	0.6%	Renter: Less than \$15,000	0.4%
Renter-occupied	0.4%	Owner: \$350 to \$599	0.5%	Renter: \$15,000 to \$29,999	0.4%
Rental: \$800 to \$1,249	0.3%	Occupied units	0.3%	Rental: \$350 to \$599	0.4%
Occupied units	0.2%			Renter-occupied	0.3%
				Occupied units	0.1%
Characteristics	'09 units added by new construction	Characteristics	'09 units added from temporary losses in 2007 stock	Characteristics	'09 units added in other ways
Owner: \$1,250 or more	3.3%	Occupied units	0.1%	Renter-occupied	0.1%
Owner: \$100,000 or more	3.0%			Occupied units	0.0%
Owner: \$50,000 to \$99,999	2.3%				
Owner-occupied	2.0%				
Occupied units	1.7%				

Where Did the 2009 Housing Stock Come From?

The section on Weighting Issues explains why CINCH analysis has to be performed separately, looking forward and looking backward. The companion paper on the weighting strategy provides more details on why it is impossible to derive a perfectly consistent tracking of the housing stock between any two periods using the AHS. But lack of absolute precision does not mean that useful answers cannot be obtained.

With this in mind, Table 18 tracks the stock from 2007 to 2009 using the numbers from our forward-looking and backward-looking analyses. The error in the estimate of the 2009 stock derived by starting with the 2007 stock and tracking inflows and outflows is 199,000 units, or only 0.2 percent of the 2009 stock. Taken together, new construction, other additions, and losses amount to 5,880,000 units; 2,547,000 newly constructed units; 1,248,000 units added other ways; and 2,085,000 losses. The 199,000-unit discrepancy is 3.4 percent of the total flows into and out of the stock.

Table 18: CINCH Derivation of 2009 Housing Stock Using 2007 Base

A	2007 Housing Stock: Published Estimate	128,203,000	
B	2007 Housing Stock: Forward-looking Estimate	128,203,000	
C	Units Lost by Demolition or Disaster	491,000	Net of C & D
D	Units Added by New Construction	2,547,000	2,056,000
E	Units Lost from Mergers or Conversions	193,000	Net of E & F
F	Units Added by Mergers or Conversions	287,000	94,000
G	House or Mobile Home Moved Out	411,000	Net of G & H
H	House or Mobile Home Moved In	470,000	59,000
I	Units Lost to Nonresidential Use	288,000	Net of I & J
J	Units Added from Nonresidential Use	261,000	-27,000
K	Units Badly Damaged or Condemned	302,000	Net of K, L, M, & N
L	Units Lost in Other Ways	400,000	-472,000
M	Units Added from Temporary Losses due to Structural Deficiencies	168,000	
N	Units added from other sources	62,000	
	Estimate of 2009 Housing Stock based on 2007 base		Difference
O	(O=B-C+D-E+F-G+H-I+J-K-L+M+N)	129,913,000	-199,000
P	2009 Housing Stock: Published Estimate	130,112,000	-0.2%

The starting point is row B, the CINCH estimate of the housing stock in 2007, which is equal to the published AHS estimate in row A. The ending point is row O, the published estimate of the housing stock in 2009. The change in the housing stock between those 2 years is 1,909,000 units. The remainder of the table uses information from CINCH analysis to explain how that change came about.

Rows C and D provide CINCH estimates of the losses by demolition and disaster and additions through new construction. New construction exceeded losses from demolition and disaster by 2,056,000.

Rows E and F provide CINCH estimates of losses and additions from the merger of two or more units into one unit and the conversion of one unit into two or more units. Additions exceeded losses by 94,000.

Rows G and H provide CINCH estimates of the losses and additions from the moving of houses and mobile homes from one location to another. Movement of units from one place to another should have a net effect of zero on the national housing stock, yet these flows combine to add 59,000 to the stock. The totals for move-outs and move-ins frequently do not agree because of limitations in the sample design, misreporting, and difficulty in distinguishing new mobile homes from move-ins.

Rows I and J provide CINCH estimates of losses and additions from the movement of units into and out of nonresidential use. Combined, these flows accounted for the loss of 27,000 from the stock.

Rows K, L, M, and N provide CINCH estimates of losses because of damage or condemnation, losses from other causes, and additions resulting from the recovery of temporary losses or from other causes. The net effect of these changes is the loss of 472,000 units from the stock. As noted earlier, the Census Bureau informed us of a coding error that affected additions from other causes in 2009. It is possible that the same error existed in 2007; if so, correcting the error in only 1 year could explain the large difference between additions and losses when rows K, L, M, and N are summed.

Combining all the additions and losses in rows C through N with the beginning stock in row B produces an estimate of 129,913,000 units in row O for the 2009 housing stock. This estimate is 199,000 less than the actual housing stock in 2009. This is the discrepancy mentioned in the second paragraph of this section. Combining the forward-looking and backward-looking analyses allows us to account for almost 90 percent of the change that took place between 2007 and 2009.

Similarly, one could track the 2009 stock backward to 2007 using CINCH estimates. All the numbers in rows C through N would be the same, and the end result would be an estimate of the 2007 stock that would be 199,000 units too large.³⁴

³⁴ The net numbers in the far right column would have the opposite sign of the numbers in the same column in Table A.

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, equality was achieved, except for differences created by rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13-26) in Table A are a disaggregation of the total stock in row 1. Similarly, rows 7 (White), 10 (Black), 13 (American Indian, Eskimo, & Aleut), 14 (Asian), 15 (Pacific Islander), and 16 (two or more races) in Table C are a disaggregation of row 1 (occupied units). 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, equality was achieved, except for differences created by 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. There are some important exceptions. Most significantly, the CINCH weights overestimate units outside of metropolitan areas by 19.5 percent in the backward-looking analysis but underestimate by only 3.2 percent in the forward-looking analysis. Households with elderly householders are overestimated by 7 to 10 percent in the forward-looking analysis and 10 to 13 percent in the backward-looking analysis. Units with Black householders are underestimated by approximately 8 percent in both the forward-looking and backward-looking analyses. Rental units with no cash rent are underestimated by 9 percent in the forward-looking analysis and by 13 percent in the backward-looking analysis. The CINCH weights underestimate owner-occupied units with monthly housing costs less than \$350. The CINCH weights seemed to have the most difficulty in estimating year built for units built after 1989; the CINCH estimates are substantially under the published estimates for the 1990-1994 and 2005-2009 periods (14 to 32 percent) and substantially over the published estimates for the 1995-1999 and 2000-2004 periods (10 to 29 percent). These estimation errors are very similar in pattern to the estimation errors in the previous CINCH analyses. The correlation between the estimation errors in the forward-looking and backward-looking analyses was 0.86.

Appendix B: Weighting

CINCH separates the AHS samples in 2007 and 2009 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 2007 housing stock but are not part of the 2009 housing stock (LOSSES), and units that are not part of the 2007 housing stock but are part of the 2009 housing stock (ADDITIONS). ADDITIONS are split into NEW CONSTRUCTION and OTHER ADDITIONS (structures that existed in 2007 but were not in the housing stock and other cases).

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 2007 and those ADDITIONS that were interviewed in 2009.

For the forward-looking analysis, we started with the AHS pure weights. We used the AHS weighted count in 2009 of LOSSES to create new pure weights for interviewed LOSSES. We used the AHS published count of the stock in 2007 and our estimate of LOSSES to create new pure weights for the interviewed SAMES. 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 2007. These matches were performed separately for mobile homes and all other structure types.

For the backward-looking analysis, we started with the AHS pure weights. We used the AHS weighted counts in 2009 for NEW CONSTRUCTION and for OTHER ADDITIONS to create new pure weights for interviewed NEW CONSTRUCTION and interviewed OTHER ADDITIONS. We used the AHS published count of the stock in 2009 and our estimates on NEW CONSTRUCTION and OTHER ADDITIONS to create new pure weights for the interviewed SAMES. We then adjusted the weights for SAMES, NEW CONSTRUCTION, and OTHER ADDITIONS to equal AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 2009. These matches were performed separately for mobile homes and all other structure types.

The logic behind the weighting and the procedures used to create the weights is explained in *Weighting Strategy For 2007-2009 CINCH Analysis*.