American Housing Survey

Components of Inventory Change: 2003-2005

March 2007

Econometrica, Inc.
under contract to:

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

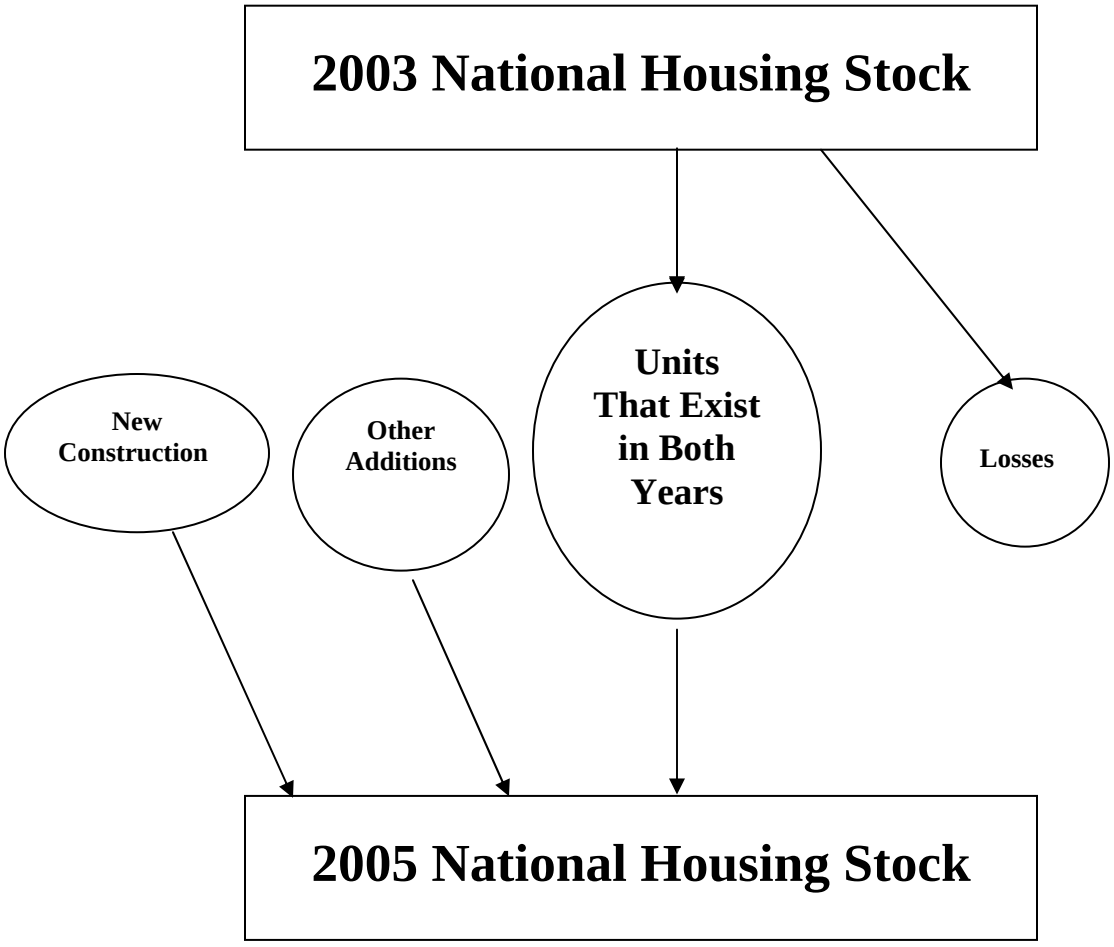
Principal Authors: Frederick J. Eggers & Fouad Moumen

Components of Inventory Change: 2003-2005

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 2003 housing stock contained 120,777,000 housing units. Most of these units continued to be part of the 2005 housing stock, but some units disappeared from the housing stock between 2003 and 2005. The AHS estimated that the 2005 housing stock contained 124,377,000 housing units. Simple arithmetic shows that new construction and other additions had to provide a sufficient number of units to overcome any losses between 2003 and 2005 and to increase the overall stock by 3,600,000 units.

In the context of Figure 1, the U.S. Census Bureau provides estimates for both rectangles (the 2003 and 2005 housing stocks) and one oval (units added through new construction between 2003 and 2005). No one estimates the other three ovals: the number of units that belong to both the 2003 and 2005 housing stock, units lost to the housing stock between 2003 and 2005, and other additions to the housing stock between 2003 and 2005.

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 and the housing inventory is the aggregation of these clumps. 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 merged into other units or units that are used for nonresidential purposes. Additions can result from splitting up larger units, 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:[1]

- 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.

[1] 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, 2005, as the current year and the previous AHS survey year, 2003, 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 2003 and 2005. In some cases, there may be no status, e.g., not yet constructed in 2003, 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 2003 and 2005.

The exact accounting would apply only to AHS sample observations, roughly a 1-in-2,200 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.[2] For example, the exact accounting might show that 2,500 sample units that were rental in 2003 became owner-occupied in 2005. To estimate the number of units in the national housing stock that were rental in 2003 and became owner-occupied in 2005, one would need to apply weights. But using 2003 weights will produce a different estimate than using 2005 weights. There is no conceptual reason to favor the answer using 2003 weights over the answer using 2005 weights. The choice of weights depends upon how the intended analysis will be used.[3]

For this reason, previous CINCH analyses have distinguished between:

> (A) *Forward-looking analysis,* that is, starting with the base year stock (2003) and determining the status and characteristics of *those* units in the current year (2005). The goal is to explain what happened to the 120,777,000 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 (2005) stock and determining the status and characteristics of *those* units in the base year (2003). The goal here is to explain where the 124,377,000 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.

We will follow the same procedure.

---

[2] 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. The pure weight of a given observation will vary between surveys if the sample size changes. 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.

[3] Weighting issues are explained in greater detail in a separate paper, *Weighting Strategy For 2003-2005 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 2003 to 2005 and identifying how units were lost to the housing stock, and a set of backward-looking tables tracing where 2005 units came from and distinguishing between units that were part of the stock in 2003 and units that were additions to the stock since 2003.
- 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 2003 and 2005.

Two appendices explain how the results were tested and how the weights were created. In addition to this report, we have produced a microdata set containing CINCH status and weights for all AHS observations used. Analysts can link this dataset to AHS files to produce custom tabulations. The dataset 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 2003 housing stock by 2005. There are three basic dispositions of 2003 units:

- Units that continue to exist in 2005 with the same characteristics (or serving the same market).
- Units that continue to exist in 2005 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 2005 housing stock came from in reference to 2003. There are three basic sources of 2005 units:

- Units that existed in 2003 with the same characteristics (or serving the same market).
- Units that existed in 2003 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 1 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 2003 AHS report counted 105,842,000 occupied units in 2003 (column B, row 2, forward-looking Table 1); the 2005 AHS report counted 108,871,000 occupied units (column B, row 2, backward-looking Table 1).

- Column C gives the CINCH estimate of the number of units that satisfy two conditions: (a) being part of the housing stock in the relevant year (2003 for the forward-looking tables and 2005 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 the appendix, the weights were created to match certain AHS published totals; for this reason, rows 2 through 4 of Table 1 are perfect matches. This perfect match will not be true for most other rows.[4]

- 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 1 estimates that 96,755,000 of the occupied units in 2003 were occupied in 2005.

- 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 8,045,000 units that were occupied in 2003 are still part of the housing stock in 2005 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

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

of structure, year built, and number of stories; these characteristics are considered impossible or unlikely to change.

Columns Unique to Forward-Looking Tables

In forward-looking tables, columns F through K track what happened to units that were lost from 2003 to 2005.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2005 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 90,000 units were lost to mergers and conversions.

- 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 many cases, these were not units that left the stock in 2004 or 2005. The AHS does not track what happens when a house or mobile home 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. Because the AHS does not know the history of these units, mobile homes that move from one lot to another are treated as both losses and additions. Among occupied units, 110,000 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.[5] Among occupied units, 110,000 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 2005. In this case, 231,000 units occupied in 2003 were demolished or destroyed.

- Column J is the CINCH estimate of the number of units from column C that by 2005 were condemned or were no longer usable for housing because of extensive damage. Among occupied units, 132,000 units are no longer usable for housing.

- Column K is the CINCH estimate of the number of units from column C that were lost by 2005 for other reasons. These include units for which permits had been granted in 2003 or earlier but where construction never started, where construction had not been completed by 2005, or where the permit was abandoned. Also included are unoccupied sites for mobile homes and losses not

[5] 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.

otherwise classified. Among occupied units, there were 369,000 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.

Columns Unique to Backward Looking Tables

In backward-looking tables, columns F through J track where units came from that are part of the housing stock in 2005 but were not part of the 2003 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 2005, 30,000 units were additions to the stock since 2003 that were created by mergers or conversions (column F, row 2 of backward-looking Table 1).

- Column G estimates the number of houses or mobile homes from column C that were moved in during the period. Among occupied units, 338,000 houses or mobile homes were moved in. In many cases, these were not units that left the stock at an earlier time and returned to the stock in 2004 or 2005. The AHS does not track what happens when a house or mobile home 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. Because the AHS does not know the history of these units, mobile homes that move from one lot to another are treated as both losses and additions.[6]

- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 2003. Among occupied units, 160,000 had been nonresidential in 2003.

- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 2003 and 2005. Among occupied units, 2,904,000 units were newly constructed.

- Column J is the CINCH estimate of the number of units from column C that were added by 2005 for other reasons. These include units that were considered temporary losses because occupancy was prohibited in 2003 or the interior of the unit was exposed to the elements, and also units that the Census Bureau considered temporarily lost to the housing stock for reasons “not classified.”

[6] The reader will notice that, for the overall housing stock (row 1), the number of houses and mobile homes moved out after 2003 is substantially less than the number moved in by 2005. These totals frequently do not agree because of limitations in the sample design and difficulty in distinguishing new mobile homes from move-ins.

Among occupied units, 323,000 had been temporarily lost to the stock in 2003 or were added 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:

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

- *Rate of total additions* – the sum of columns F through J in the backward-looking tables divided by column C.

- *New construction rate* – column I in the backward-looking tables divided by column C.

- *Other additions rate* – the sum of columns F, G, H, and J in the backward-looking tables divided by column C.

The rate of total additions equals the new construction rate plus the other additions rate.[7]

The discussion will also compare the rate at which selected events occur for certain parts of the housing stock with the rate at which those events occur for either the entire stock (Table 1) or the occupied stock (Tables 2, 3, and 4). For example, among all units in the 2003 housing stock, 0.2 percent were lost by 2005 because they had been condemned or were seriously damaged. The loss rate for vacant units was 1.0 percent. Therefore, vacant units were 5 times more likely to be lost because of severe damage than the typical unit.

Finally, the report will occasionally look at *persistence*, the tendency for a characteristic to appear in the same unit in both survey years.

- For the forward-looking tables, persistence is the ratio of the number of units with a given characteristic in 2003 that survive to 2005 and have the same characteristic in 2005 to the number of units with that characteristic in 2003 that survived to 2005, with or without that characteristic in 2005.

- For the backward-looking tables, persistence is the ratio of the number of units with a given characteristic in 2005 that existed in 2003 and had the same characteristic in 2003 to the number of units in 2005 with that characteristic and that existed in 2003, with or without that characteristic.

In both cases, the ratio is calculated as column D divided by the sum of columns D and E.

[7] These rates are calculated using unrounded numbers, thus the reported rates may differ from rates computed from the tables in this report.

Forward-Looking Table 1: Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units lost due to conversion /merger	G '03 house or mobile home moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
1	**Total Housing Stock**	120,777	120,777	118,893	0	146	245	278	399	274	543	1
	Occupancy Status											
2	**Occupied**	105,842	105,842	96,755	8,045	90	110	110	231	132	369	2
3	**Vacant**	11,369	11,369	4,023	6,695	51	101	110	132	126	131	3
4	**Seasonal**	3,566	3,566	2,100	1,275	5	35	58	35	16	43	4
	Units in Structure											
5	**1, detached**	74,916	74,831	74,104	0	28	49	82	223	130	215	5
6	**1, attached**	7,227	7,200	7,085	0	15	0	23	15	20	42	6
7	**2 to 4**	9,965	9,919	9,664	0	87	2	32	59	36	40	7
8	**5 to 9**	6,012	5,872	5,807	0	8	0	12	19	18	7	8
9	**10 to 19**	5,433	5,394	5,334	0	2	0	7	19	14	18	9
10	**20 to 49**	3,964	4,053	3,993	0	3	0	37	0	2	18	10
11	**50 or more**	4,289	4,537	4,457	0	2	0	46	11	2	20	11
12	**Mobile Home/trailer**	8,971	8,971	8,450	0	1	194	40	52	51	184	12
	Year Built											
13	**2005-2009**											13
14	**2000-2004**	6,237	6,231	6,178	0	0	15	4	10	2	22	14
15	**1995-1999**	8,851	9,885	9,701	0	0	48	13	12	11	100	15
16	**1990-1994**	7,155	7,430	7,353	0	5	26	30	0	2	15	16
17	**1985-1989**	8,865	8,407	8,325	0	2	17	8	13	2	39	17
18	**1980-1984**	7,584	7,684	7,607	0	3	11	13	9	2	39	18
19	**1975-1979**	12,314	12,083	11,891	0	18	28	30	36	28	52	19
20	**1970-1974**	11,188	11,294	11,099	0	5	14	29	45	28	74	20
21	**1960-1969**	15,482	15,503	15,263	0	6	56	25	59	37	57	21
22	**1950-1959**	13,433	13,186	13,006	0	23	9	32	55	37	25	22
23	**1940-1949**	8,152	7,965	7,827	0	18	15	7	41	23	34	23
24	**1930-1939**	6,362	6,249	6,122	0	19	2	18	24	39	25	24
25	**1920-1929**	5,479	5,354	5,224	0	25	0	16	38	24	27	25
26	**1919 or earlier**	9,672	9,506	9,298	0	23	4	53	55	39	34	26

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

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units lost due to conversion /merger	G '03 house or mobile home moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
	Rooms											
27	**1 room**	520	585	246	239	9	5	48	11	4	24	27
28	**2 rooms**	1,432	1,433	544	788	13	2	21	11	4	50	28
29	**3 rooms**	10,939	10,863	7,482	3,074	51	33	71	56	50	47	29
30	**4 rooms**	23,360	23,186	15,093	7,613	26	87	47	114	88	118	30
31	**5 rooms**	27,961	28,202	15,871	11,867	25	76	26	85	80	171	31
32	**6 rooms**	24,657	24,405	12,461	11,735	5	32	24	76	13	61	32
33	**7 rooms**	14,662	14,591	6,298	8,172	11	11	20	32	17	30	33
34	**8 rooms**	8,283	8,448	3,568	4,832	0	0	4	12	7	26	34
35	**9 rooms**	3,921	3,974	1,430	2,515	2	0	15	0	5	7	35
36	**10 rooms or more**	5,042	5,090	1,897	3,169	4	0	2	2	7	9	36
	Bedrooms											
37	**None**	1,216	1,237	581	507	13	5	68	15	6	42	37
38	**1**	14,389	14,351	11,635	2,329	63	32	73	72	54	92	38
39	**2**	34,810	34,699	28,214	5,887	40	89	67	146	115	140	39
40	**3**	48,819	48,820	41,327	6,885	14	104	53	135	72	231	40
41	**4 or more**	21,543	21,669	17,894	3,634	15	14	17	31	26	37	41
42	**Multiunit Structures**	29,663	29,775	29,254	0	101	2	133	109	73	103	42
	Stories in Structures											
43	**1**	NA	3,420	3,320	0	23	2	2	44	13	16	43
44	**2**	NA	12,740	12,544	0	43	0	35	52	26	40	44
45	**3**	NA	7,525	7,399	0	29	0	53	7	24	12	45
46	**4 to 6**	NA	4,153	4,081	0	4	0	32	6	4	26	46
47	**7 or more**	NA	1,936	1,909	0	2	0	11	0	5	9	47
	Region											
48	**Northeast**	22,602	22,869	22,588	0	32	17	73	46	54	60	48
49	**Midwest**	27,893	28,240	27,914	0	39	23	57	76	57	75	49
50	**South**	44,659	44,838	43,890	0	42	183	89	199	112	323	50
51	**West**	25,623	24,831	24,501	0	33	21	59	78	52	86	51

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

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units lost due to conversion /merger	G '03 house or mobile home moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
	Metro Status											
52	**Inside metro area**	94,488	90,494	89,281	0	124	87	192	272	147	390	52
53	**In central cities**	35,217	33,857	33,347	0	73	2	106	107	81	141	53
54	**In suburbs**	59,271	56,637	55,934	0	51	85	86	165	66	249	54
55	**Outside metro area**	26,289	30,283	29,612	0	22	158	85	126	127	153	55
	Mover Status											
56	**Moved in last 2 years**	NA	17,097	943	15,970	21	13	21	49	31	48	56
57	**Not a recent mover**	NA	88,745	74,741	13,145	69	96	89	182	102	320	57

Forward-Looking Table 2: Condition of Unit – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units lost due to conversion /merger	G '03 house or mobile home moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
1	**Occupied Units**	105,842	105,842	96,755	8,045	90	110	110	231	132	369	1
	Kitchen											
2	**With complete kitchen**	104,289	104,363	94,637	8,757	85	110	87	224	123	340	2
3	**Lacking complete kitchen facilities**	1,553	1,479	162	1,244	5	0	23	7	9	29	3
	Plumbing											
4	**With all plumbing facilities**	104,487	104,510	94,569	8,933	88	110	97	227	130	357	4
5	**Lack some plumbing**	1,355	1,332	102	1,196	2	0	13	5	2	12	5
6	**No hot piped water**	225	223	45	149	0	0	12	5	2	9	6
7	**No bathtub/shower**	166	170	60	82	0	0	11	2	2	12	7
8	**No flush toilet**	139	144	58	59	0	0	11	2	2	12	8
9	**No exclusive use**	1,063	1,040	18	1,019	2	0	0	0	0	0	9
	Water											
10	**Public/private water**	92,324	91,226	82,981	7,394	88	80	100	165	116	302	10
11	**Well**	13,097	14,088	12,727	1,177	2	27	10	64	17	64	11
12	**Other water source**	422	528	390	131	0	3	0	2	0	2	12
	Sewer											
13	**Public sewer**	84,064	83,036	73,912	8,401	85	36	82	136	111	273	13
14	**Septic tank/cesspool**	21,697	22,713	18,886	3,527	5	74	21	93	21	87	14
15	**Other**	81	93	31	43	0	0	7	2	0	9	15
16	**Severe Problems**	1,970	1,946	193	1,711	2	0	13	7	2	17	16
17	**Plumbing**	1,355	1,332	102	1,196	2	0	13	5	2	12	17
18	**Heating**	495	492	45	440	0	0	0	2	0	5	18
19	**Electric**	93	88	28	50	0	0	0	2	0	7	19
20	**Upkeep**	87	100	0	100	0	0	0	0	0	0	20
21	**Hallways**	7	5	0	5	0	0	0	0	0	0	21

Forward-Looking Table 2 (continued): Condition of Unit – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units lost due to conversion /merger	G '03 house or mobile home moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
22	**Moderate problems**	4,320	4,225	1,386	2,714	9	10	12	27	31	36	22
23	**Plumbing**	195	213	5	196	0	0	0	2	0	10	23
24	**Heating**	1,447	1,552	1,163	344	2	10	0	9	12	12	24
25	**Kitchen**	1,410	1,479	162	1,244	5	0	23	7	9	29	25
26	**Upkeep**	1,303	1,380	137	1,199	5	0	2	8	24	5	26
27	**Hallways**	148	170	0	165	0	0	0	2	2	0	27

Forward-Looking Table 3: Household Characteristics – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units lost due to conversion /merger	G '03 house or mobile home moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
1	**Occupied units**	105,842	105,842	96,755	8,045	90	110	110	231	132	369	1
	Age											
2	**Under 65**	84,215	82,921	72,759	9,300	88	77	89	200	118	289	2
3	**65 to 74**	10,782	11,434	7,986	3,389	2	16	5	10	5	22	3
4	**75 or older**	10,845	11,487	8,907	2,459	0	16	16	22	9	57	4
	Children											
5	**Some**	38,158	37,771	27,900	9,437	34	54	28	103	59	156	5
6	**None**	67,864	68,071	56,261	11,202	56	55	82	129	73	213	6
	Race/Origin											
7	**White**	87,483	88,599	78,892	8,895	70	83	95	182	94	288	7
8	**Hispanic**	10,125	10,159	7,779	2,264	18	7	12	29	14	35	8
9	**Non-Hispanic**	77,358	78,441	68,880	8,864	53	76	83	153	80	253	9
10	**Black**	13,004	11,972	9,228	2,586	17	16	8	24	31	63	10
11	**Hispanic**	456	402	172	222	2	0	0	0	5	0	11
12	**Non-Hispanic**	12,548	11,570	8,981	2,438	14	16	8	24	26	63	12
13	**American Indian, Eskimo, Aleut**	664	696	404	270	0	0	0	5	2	15	13
14	**Asian**	3,183	3,131	2,283	820	3	0	7	14	2	2	14
15	**Pacific Islander**	295	295	160	135	0	0	0	0	0	0	15
16	**Two or more races**	1,215	1,149	641	488	0	11	0	7	2	0	16
17	**Total Hispanics**	11,038	11,011	8,622	2,265	20	7	12	31	19	35	17
	Income Source											
18	**Wages and salaries**	83,070	82,333	65,964	15,589	66	86	71	188	94	274	18
19	**Self-employed**	10,062	10,124	4,115	5,931	7	8	5	19	14	26	19
20	**Social security or pension**	28,485	30,003	21,688	8,071	14	43	21	51	33	82	20
21	**Dividend or interest**	NA	32,301	9,894	22,269	12	11	15	28	12	61	21
22	**Welfare or SSI**	4,975	5,102	1,812	3,218	9	11	12	9	17	14	22

Forward-Looking Table 4: Tenure, Housing Cost, and Income – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units affected by conversion /merger	G '03 mobile homes moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
1	**Occupied units**	105,842	105,842	96,755	8,045	90	110	110	231	132	369	1
	Tenure											
2	**Owner occupied**	72,238	72,238	66,061	5,716	14	80	28	96	44	200	2
3	**Percent owner occupied**	68.3%	68.3%									3
4	**Renter occupied**	33,604	33,604	25,549	7,474	76	30	82	135	88	169	4
	Renter Monthly Housing Costs											
5	**No cash rent**	2,218	1,850	762	1,021	7	5	7	12	12	24	5
6	**Less than $350**	4,150	4,426	1,993	2,322	12	10	25	22	17	27	6
7	**$350 to $599**	9,366	9,334	4,487	4,666	32	7	8	33	41	59	7
8	**$600 to $799**	8,014	7,992	3,526	4,350	16	5	9	46	7	33	8
9	**$800 to $1,249**	7,399	7,403	3,796	3,524	7	2	24	22	12	16	9
10	**$1,250 or more**	2,458	2,599	1,372	1,206	2	0	9	0	0	9	10
	Renter Hsd Income											
11	**Less than $15,000**	9,425	9,524	4,153	5,143	27	15	36	45	34	70	11
12	**$15,000 to $29,999**	9,016	8,938	2,612	6,165	27	10	20	36	29	39	12
13	**$30,000 to $49,999**	8,054	7,915	2,158	5,649	17	5	12	26	9	38	13
14	**$50,000 to $99,999**	5,810	5,846	1,773	3,993	5	0	14	28	14	19	14
15	**$100,000 or more**	1,300	1,382	316	1,060	0	0	0	0	2	2	15
	Owner Monthly Housing Costs											
16	**Less than $350**	18,658	17,000	8,653	8,150	7	44	7	50	23	66	16
17	**$350 to $599**	12,507	12,904	4,964	7,872	0	18	9	10	2	29	17
18	**$600 to $799**	8,340	8,264	2,493	5,695	5	13	2	14	5	38	18
19	**$800 to $1,249**	14,780	14,532	6,826	7,651	2	5	5	7	7	29	19
20	**$1,250 or more**	17,954	19,538	13,963	5,511	0	0	5	15	7	38	20

Forward-Looking Table 4: Tenure, Housing Cost, and Income (continued) – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2003	D 2003 units present in 2005	E Change in character-istics	F '03 units affected by conversion /merger	G '03 mobile homes moved out	H '03 units changed to nonresidential use	I '03 units lost through demolition or disaster	J '03 units badly damaged or condemned	K '03 units lost in other ways	
	Owner Hsd Income											
21	**Less than $15,000**	8,481	8,459	3,331	5,041	0	6	2	23	9	47	21
22	**$15,000 to $29,999**	11,381	11,701	3,973	7,631	7	16	9	16	9	39	22
23	**$30,000 to $49,999**	14,513	14,423	4,820	9,496	2	24	5	26	12	39	23
24	**$50,000 to $99,999**	23,692	23,511	12,221	11,159	5	34	12	22	12	48	24
25	**$100,000 or more**	14,171	14,145	7,839	6,266	0	0	0	9	2	27	25

Backward-Looking Table 1: Structural and Location Characteristics – All Housing Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2005	D 2005 units present in 2003	E Change in character-istics	F '05 units created by conversion /merger	G '05 house or mobile home moved in	H '05 units derived from nonresidential use	I '05 units added by new construction	J '05 units added from temporary losses or other	
1	**Total Housing Stock**	124,377	124,376	119,323	0	43	442	395	3,601	572	1
	Occupancy Status										
2	**Occupied**	108,871	108,871	97,339	7,776	30	338	160	2,904	323	2
3	**Vacant**	11,660	11,660	3,942	6,704	13	63	159	602	177	3
4	**Seasonal**	3,845	3,845	2,123	1,439	0	40	76	95	72	4
	Units in Structure										
5	**1, detached**	77,703	77,603	74,705	0	18	20	115	2,545	200	5
6	**1, attached**	7,046	6,867	6,409	0	4	0	30	376	47	6
7	**2 to 4**	10,071	9,818	9,502	0	21	0	56	167	73	7
8	**5 to 9**	6,073	5,823	5,720	0	1	0	9	83	9	8
9	**10 to 19**	5,696	5,732	5,567	0	0	0	10	131	23	9
10	**20 to 49**	4,402	4,593	4,418	0	0	0	33	117	25	10
11	**50 or more**	4,757	5,310	4,948	0	0	0	113	136	113	11
12	**Mobile Home/trailer**	8,630	8,631	8,053	0	0	421	30	47	80	12
	Year Built										
13	**2005-2009**	944	695	8	0	0	0	0	683	5	13
14	**2000-2004**	9,194	8,949	6,001	0	2	110	15	2,758	63	14
15	**1995-1999**	8,830	8,845	8,673	0	4	75	28	30	34	15
16	**1990-1994**	7,158	6,931	6,855	0	0	43	9	5	18	16
17	**1985-1989**	8,859	8,671	8,571	0	0	55	20	3	22	17
18	**1980-1984**	7,517	7,389	7,298	0	2	47	9	1	33	18
19	**1975-1979**	14,350	14,601	14,378	0	2	42	73	46	60	19
20	**1970-1974**	10,741	11,182	11,066	0	2	19	14	27	53	20
21	**1960-1969**	15,192	15,402	15,248	0	7	32	42	12	61	21
22	**1950-1959**	13,003	12,955	12,823	0	2	13	65	10	42	22
23	**1940-1949**	7,904	7,920	7,838	0	4	2	31	6	39	23
24	**1930-1939**	6,009	6,034	5,985	0	3	0	17	0	29	24
25	**1920-1929**	5,313	5,295	5,231	0	2	2	18	6	36	25
26	**1919 or earlier**	9,364	9,507	9,347	0	13	0	55	16	77	26

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

	A Characteristics	B Published numbers	C Present in 2005	D 2005 units present in 2003	E Change in character-istics	F '05 units created by conversion /merger	G '05 house or mobile home moved in	H '05 units derived from nonresidential use	I '05 units added by new construction	J '05 units added from temporary losses or other	
	Rooms										
27	**1 room**	637	683	248	316	1	4	74	5	35	27
28	**2 rooms**	1,399	1,400	534	741	2	2	54	22	47	28
29	**3 rooms**	10,941	10,823	7,457	2,875	17	25	90	189	170	29
30	**4 rooms**	22,774	23,023	14,975	7,286	9	153	82	385	133	30
31	**5 rooms**	28,619	28,448	15,821	11,631	8	186	23	686	94	31
32	**6 rooms**	25,325	25,167	12,600	11,707	7	40	21	727	65	32
33	**7 rooms**	15,284	15,277	6,377	8,312	0	13	9	557	9	33
34	**8 rooms**	8,857	8,911	3,623	4,815	0	10	17	435	11	34
35	**9 rooms**	4,246	4,284	1,455	2,581	0	0	8	240	0	35
36	**10 rooms or more**	6,296	6,360	1,921	4,048	0	10	18	356	7	36
	Bedrooms										
37	**None**	1,270	1,335	582	554	1	4	111	19	64	37
38	**1**	14,633	14,482	11,603	2,272	20	30	117	234	205	38
39	**2**	34,326	34,483	28,102	5,358	13	172	92	591	154	39
40	**3**	50,869	50,721	41,587	7,230	7	202	42	1,531	122	40
41	**4 or more**	23,279	23,355	18,123	3,912	2	33	33	1,226	26	41
42	**Multiunit Structures**	30,999	31,276	30,156	0	21	0	220	634	244	42
	Stories in Structures										
43	**1**	NA	3,208	3,078	0	2	0	34	55	39	43
44	**2**	NA	12,793	12,452	0	7	0	63	232	38	44
45	**3**	NA	8,487	8,137	0	6	0	55	224	65	45
46	**4 to 6**	NA	4,600	4,399	0	6	0	31	89	76	46
47	**7 or more**	NA	2,188	2,089	0	0	0	38	34	27	47
	Region										
48	**Northeast**	22,839	23,264	22,688	0	12	43	54	343	124	48
49	**Midwest**	28,642	28,948	28,021	0	10	55	71	696	95	49
50	**South**	46,400	46,338	43,970	0	9	296	175	1,638	250	50
51	**West**	26,496	25,825	24,645	0	13	47	95	923	102	51
	Metro Status										
52	**Inside metro area**	94,798	91,745	89,796	0	34	183	249	1,160	323	52
53	**In central cities**	35,826	34,862	33,548	0	30	24	156	906	198	53
54	**In suburbs**	58,971	56,882	56,248	0	4	159	93	254	125	54
55	**Outside metro area**	29,579	32,631	29,528	0	9	258	146	2,441	248	55

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

	A Characteristics	B Published numbers	C Present in 2005	D 2005 units present in 2003	E Change in character-istics	F '05 units created by conversion /merger	G '05 house or mobile home moved in	H '05 units derived from nonresidential use	I '05 units added by new construction	J '05 units added from temporary losses or other	
	Mover Status										
56	Moved in last 2 years	NA	21,120	7,058	11,903	25	108	62	1,834	131	56
57	Not a recent mover	NA	84,722	67,943	15,613	32	270	54	701	109	57

Backward-Looking Table 2: Condition of Unit – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2005	D 2005 units present in 2003	E Change in character-istics	F '05 units created by conversion /merger	G '05 house or mobile home moved in	H '05 units derived from nonresidential use	I '05 units added by new construction	J '05 units added from temporary losses or other	
1	**Occupied Units**	108,871	108,871	97,339	7,776	30	338	160	2,904	323	1
	Kitchen										
2	**With complete kitchen**	107,177	107,313	95,227	8,408	28	338	136	2,871	305	2
3	**Lacking complete kitchen facilities**	1,695	1,558	163	1,318	2	0	25	33	17	3
	Plumbing										
4	**With all plumbing facilities**	107,574	107,563	95,145	8,702	30	334	143	2,896	315	4
5	**Lack some plumbing**	1,297	1,308	102	1,167	0	5	18	8	8	5
6	**No hot piped water**	223	226	45	150	0	5	15	3	8	6
7	**No bathtub/shower**	160	158	61	73	0	0	15	3	6	7
8	**No flush toilet**	141	138	58	59	0	0	15	0	6	8
9	**No exclusive use**	1,034	1,037	19	1,010	0	0	2	6	0	9
	Water										
10	**Public/private water**	95,313	94,219	83,499	7,454	23	232	142	2,579	289	10
11	**Well**	13,132	14,149	12,798	870	7	107	17	322	29	11
12	**Other water source**	427	503	389	105	0	0	2	3	5	12
	Sewer										
13	**Public sewer**	86,850	86,114	74,433	8,847	18	102	132	2,341	240	13
14	**Septic tank/cesspool**	21,967	22,697	18,948	2,835	11	236	26	563	77	14
15	**Other**	54	61	31	21	0	0	2	0	6	15
16	**Severe Problems**	2,021	2,037	191	1,795	0	5	18	20	8	16
17	**Plumbing**	1,297	1,308	102	1,167	0	5	18	8	8	17
18	**Heating**	642	655	42	605	0	0	0	8	0	18
19	**Electric**	72	67	29	34	0	0	0	3	2	19
20	**Upkeep**	53	56	0	56	0	0	0	0	0	20
21	**Hallways**	0	0	0	0	0	0	0	0	0	21
22	**Moderate problems**	4,175	4,151	1,400	2,661	2	17	7	40	23	22
23	**Plumbing**	155	178	5	173	0	0	0	0	0	23
24	**Heating**	1,273	1,434	1,176	242	0	9	0	0	7	24
25	**Kitchen**	1,544	1,558	163	1,318	2	0	25	33	17	25
26	**Upkeep**	1,213	1,305	136	1,146	0	7	2	7	6	26
27	**Hallways**	118	146	0	144	0	0	0	0	2	27

Backward-Looking Table 3: Household Characteristics – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2005	D 2005 units present in 2003	E Change in character-istics	F '05 units created by conversion /merger	G '05 house or mobile home moved in	H '05 units derived from nonresidential use	I '05 units added by new construction	J '05 units added from temporary losses or other	
1	**Occupied units**	108,871	108,871	97,339	7,776	30	338	160	2,904	323	1
	Age										
2	**Under 65**	86,675	85,661	73,210	9,169	25	305	133	2,605	214	2
3	**65 to 74**	11,082	11,553	8,028	3,254	5	18	7	200	42	3
4	**75 or older**	11,115	11,657	8,964	2,491	0	16	21	99	66	4
	Children										
5	**Some**	38,493	38,401	28,067	8,685	5	180	34	1,357	73	5
6	**None**	70,378	70,470	56,598	11,766	25	158	126	1,548	249	6
	Race/Origin										
7	**White**	89,449	90,617	79,382	8,118	22	287	135	2,421	252	7
8	**Hispanic**	10,747	11,239	7,826	2,971	9	21	26	352	34	8
9	**Non-Hispanic**	78,702	79,378	69,321	7,383	13	266	109	2,069	218	9
10	**Black**	13,447	12,350	9,253	2,750	5	34	18	240	48	10
11	**Hispanic**	402	360	173	181	0	0	0	6	0	11
12	**Non-Hispanic**	13,045	11,990	9,006	2,643	5	34	18	234	48	12
13	**American Indian, Eskimo, Aleut**	800	787	402	354	0	12	0	17	2	13
14	**Asian**	3,510	3,512	2,306	1,019	2	0	5	168	13	14
15	**Pacific Islander**	269	258	161	90	0	0	0	6	1	15
16	**Two or more races**	1,397	1,347	647	633	0	5	2	53	7	16
17	**Total Hispanics**	11,651	12,089	8,673	2,955	9	21	26	368	37	17
	Income Source										
18	**Wages and salaries**	81,364	80,680	66,406	11,309	25	266	106	2,415	153	18
19	**Self-employed**	14,221	14,356	4,171	9,641	5	40	19	454	27	19
20	**Social security or pension**	27,901	29,005	21,788	6,520	5	73	37	463	120	20
21	**Dividend or interest**	17,631	17,922	10,009	7,350	5	14	18	479	47	21
22	**Welfare or SSI**	NA	6,093	1,799	4,106	2	20	5	106	55	22

Backward-Looking Table 4: Tenure, Housing Cost, and Income – All Occupied Units (counts in thousands)

	A Characteristics	B Published numbers	C Present in 2005	D 2005 units present in 2003	E Change in character-istics	F '05 units created by conversion /merger	G '05 house or mobile home moved in	H '05 units derived from nonresidential use	I '05 units added by new construction	J '05 units added from temporary losses or other	
1	**Occupied units**	108,871	108,871	97,339	7,776	30	338	160	2,904	323	1
	Tenure										
2	**Owner occupied**	74,931	74,931	66,650	5,523	9	257	47	2,353	92	2
3	**Percent own occupied**	68.8%	68.8%								3
4	**Renter occupied**	33,940	33,940	25,524	7,419	21	81	114	552	231	4
	Renter Monthly Housing Costs										
5	**No cash rent**	2,134	1,831	757	1,000	2	12	23	20	17	5
6	**Less than $350**	3,733	3,930	1,992	1,783	2	10	15	37	90	6
7	**$350 to $599**	8,298	8,340	4,482	3,655	5	30	27	95	46	7
8	**$600 to $799**	7,793	7,782	3,521	4,075	2	19	14	126	24	8
9	**$800 to $1,249**	8,451	8,488	3,797	4,503	3	10	11	143	20	9
10	**$1,250 or more**	3,530	3,569	1,365	2,011	6	0	23	131	33	10
	Renter Hsd Income										
11	**Less than $15,000**	9,823	9,864	4,159	5,328	2	42	52	144	136	11
12	**$15,000 to $29,999**	8,804	8,654	2,596	5,800	10	22	22	151	53	12
13	**$30,000 to $49,999**	7,623	7,643	2,157	5,341	1	12	23	87	21	13
14	**$50,000 to $99,999**	6,273	6,310	1,771	4,393	7	5	11	108	15	14
15	**$100,000 or more**	1,417	1,469	314	1,083	0	0	5	62	6	15
	Owner Monthly Housing Costs										
16	**Less than $350**	15,914	14,389	8,606	5,407	2	133	7	207	28	16
17	**$350 to $599**	13,075	13,131	4,978	7,869	2	46	14	199	23	17
18	**$600 to $799**	8,125	8,225	2,494	5,539	0	43	5	142	2	18
19	**$800 to $1,249**	15,663	15,557	6,908	8,085	2	34	7	500	21	19
20	**$1,250 or more**	22,155	23,628	14,177	8,110	2	2	14	1,305	18	20
	Owner Hsd Income										
21	**Less than $15,000**	8,637	8,760	3,318	5,248	0	52	8	124	10	21
22	**$15,000 to $29,999**	10,724	10,865	3,954	6,674	0	49	3	177	8	22
23	**$30,000 to $49,999**	14,385	14,362	4,847	8,973	0	104	9	398	32	23
24	**$50,000 to $99,999**	25,831	25,654	12,368	12,188	7	45	23	993	30	24
25	**$100,000 or more**	15,353	15,290	7,963	6,640	2	8	5	660	11	25

Discussion of CINCH Results

Forward-Looking Analysis – Table 1

Table 1 focuses on the general housing characteristics of the stock. Row 1 provides the highest level CINCH overview of the stock. For this row, column A specifies no conditions other than being part of the stock in the relevant year. Overall the loss rate was 1.6 percent, that is, on average 16 out of every 1,000 units were lost to the stock between 2003 and 2005. The largest source of losses is "other losses," a category that includes units still under construction or abandoned while under construction, and losses for unclassified reasons. Demolitions and disaster losses are the second highest category of losses, followed by losses to nonresidential uses and units badly damaged or condemned.

Rows 2-4 divide the housing stock by use. By Census Bureau definition, the number of occupied non-seasonal units equals the number of households. Because households are the basis for all the analyses in Tables 2 through 4, it is important to get a good starting point for these estimates. For this reason, the weights are designed to match published AHS totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units.[8] "Occupied units" is the sum of owner-occupied units and renter-occupied units.

The loss rate was substantially higher among vacant and seasonal units (5.7 and 5.3 percent, respectively) than among occupied units (1.0 percent). Vacant units were 3.5 times more likely to be lost through demolition or disasters than the typical unit and 5 times more likely to be lost because of damage or condemnation.

Rows 5-12 divide the housing stock by type of structure to see what type of units account for losses. Mobile homes had the highest loss rate, almost 6 percent. The "moved out" category accounted for the largest number of mobile home losses. Units in structures containing two to four units were over 7 times more likely to be lost through conversions and mergers than the typical unit. Units in structures containing 50 or more units were over 4 times more likely to be lost to nonresidential use than the typical unit.

Rows 13-26 divide the housing stock by year built. Column I shows that losses due to demolition or disasters were heavily concentrated in the older units, but the percent of units lost to this cause never exceeds 0.7 percent for any of the age brackets. Units built before 1940 were, in general, more likely to be lost through conversions and mergers, changes to nonresidential use, demolition or disaster, and damage or condemnation than the typical unit.

Rows 27-36 and 37-41 divide the housing stock by two different measures of interior space: the number of rooms and the number of bedrooms. Smaller units have higher loss rates than larger units and, in particular, are more likely to be lost to conversions and

[8] 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.

mergers and to nonresidential use. One-room units were 13 times more likely to be lost to conversions and mergers and 35 times more likely to be lost to nonresidential use than the typical unit.

Rows 42-47 focus on multiunit structures only and separate them by number of stories. Multiunit structures have a slightly higher loss rate than the typical unit, 1.8 percent vs. 1.6 percent. The highest loss rate (2.9 percent) belonged to units in one-story multiunit structures. These units were 6 times more likely to be lost through conversion or merger.

Rows 48-51 divide the housing stock by the four Census regions. The South had the highest loss rate (2.1 percent), while the Midwest had the lowest rate (1.2 percent). Mobile home move-outs were twice as likely to occur in the South as in general.

Rows 52-55 divide the housing stock between central city, suburban, and non-metropolitan residences. Units outside metropolitan areas had the highest loss rate (2.2 percent). The mobile home move-out rate in these areas was almost 3 times as high as the overall rate.

Rows 56-57 identify units housing recent movers in 2003 from those with longer term occupants. A recent mover was defined as a householder who moved into the unit in the survey year or the prior year. The overall loss rate and the types of losses did not differ greater by whether or not a unit was occupied by a recent mover.

Forward-Looking Analysis – Table 2

This table looks at issues related to the physical quality of units that raise two housing market concerns. One concern is the extent of problems, that is, the percentage of occupied units that has the problem. A second concern is failure to correct problems, that is, the percentage of units that had a problem in 2003 and remain in the stock with the same problem in 2005. This report uses the term “persistence” for the second percentage. Row 1 repeats row 2 in Table 1. All the subsequent rows are subsets of row 1. The loss rate for occupied units was 1.0 percent.

Rows 2-3 look at whether the units have complete kitchens, that is, have an installed sink with piped water, a mechanical refrigerator, and built-in burners for the exclusive use of the occupants. Rows 4-5 look at whether the units have complete plumbing facilities, that is, hot and cold piped water, a flush toilet, and a bathtub or shower inside the structure, all for the exclusive use of the occupants. Rows 6-9 look at each of these plumbing requirements separately. Rows 2-3 and 4-9 separate out good units from the least desirable units based on kitchen and bath equipment and compare how the units changed over the period.

Units that lack a complete kitchen and units that lack complete plumbing have high loss rates: 4.9 percent and 2.6 percent, respectively. Compared with all occupied units, units without complete kitchens are 15 times more likely to be converted to nonresidential use, 5 times more likely to be unusable because of damage or condemnation, and almost 4

times more likely to be lost through mergers or conversions. Column C, rows 5 through 9, shows that while there is overlap among the four reasons that units are designated as lacking complete plumbing, the most common reason is not having exclusive use of the bathroom fixtures. The loss rate for units without exclusive use of bathroom facilities is actually lower than the loss rate for all occupied units. However, units lacking hot water, toilets, or either a bathtub or shower have substantially higher loss rates, ranging from 13 to 19 times higher than all occupied units.

Rows 10-15 look at how units obtain water and dispose of sewage. Loss rates are only slightly higher for units that use a well for water or that use a septic tank or cesspool, 1.3 percent in both cases.

Rows 16-21 look at units with severe physical problems.[9] Rows 17-21 identify specific types of serious deficiencies. Row 16 counts the units having one or more of these deficiencies. In 2003, 1.8 percent of occupied units had serious deficiencies. By 2005, 2.1 percent of units with severe problems were no longer in the stock; of those still in the stock, 89.8 percent no longer had serious deficiencies. Plumbing deficiencies accounted for the largest number of units with severe problems. Units with serious electrical problems had the highest loss rate, 10.8 percent. Units with severe physical problems were 7 times more likely to be lost to nonresidential use than the typical occupied unit, but only 1.7 times more likely to be lost through demolition or disaster.

Rows 22-27 look at units with moderate physical problems.[10] Rows 23-27 identify specific types of deficiencies. Row 22 counts the units having one or more of these deficiencies. In 2003, 4.0 percent of the units had moderate deficiencies. By 2005, 3.0 percent were no longer in the stock; of those still in the stock, 66.2 percent of these units no longer had moderate deficiencies. Problems with heating, kitchen, and upkeep were the three most frequent causes for a unit to be classified as having moderate physical problems. Units with plumbing problems had the highest loss rates, 5.7 percent. Units with moderate physical problems were almost 6 times more likely to be lost through damage or condemnation than the typical occupied unit.

Table 2 shows that there is some persistence with physical problems over a 2-year period. Among the units that had severe physical problems in 2003 *and* survived to 2005, 10.2 percent had severe physical problems in 2005. Among the units that had moderate physical problems in 2003 *and* survived to 2005, 33.8 percent had moderate physical problems in 2005. As noted in the discussion of rows 5-9, “no exclusive use” was the most common reason that units were designated as lacking some plumbing. There was virtually no persistence in this characteristic. Only 1.8 percent of the units that had no exclusive use of plumbing facilities in 2003 and that survived to 2005 were determined to have no exclusive use in 2005. In contrast, 50.0 percent of the units where there was no

[9] For definitions of severe and moderate problems see pages 1,043 and 1,044 of the AHS Codebook, version 1.8, at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf.

[10] If a unit has one severe deficiency, it is classified as having severe physical problems. A unit with both severe and moderate deficiencies is included among units with severe physical problems, but is not included among units with moderate physical problems.

flush toilet in 2003 and that survived to 2005 were determined to have no flush toilet in 2005.

Forward-Looking Analysis – Table 3

This table pertains to the characteristics of occupants. Row 1 repeats row 2 in Table 1. 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 general consistency in loss rates across categories defined by the characteristic of the householder or household. The highest loss rates were experienced by units with American Indian, Eskimo, or Aluet householders, 3.2 percent, while none of the 295,000 units with Hawaiian or Pacific Islander householders was lost between 2003 and 2005. Among units whose occupants received welfare or SSI income in 2003, only 36.0 percent of the units had occupants who were receiving income from these sources in 2005.

Forward-Looking Analysis – Table 4

Table 4 pertains to tenure, income, and housing costs. Row 1 repeats row 2 in Table 1. 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. Among units that remained in the stock, 92 percent of the units that were owner-occupied in 2003 were owner-occupied in 2005, and 77 percent that were renter-occupied in 2003 were renter-occupied in 2005. Rental units had a loss rate of 1.8 percent compared with 0.6 percent for owner-occupied units. Rental units were twice as likely as typical occupied units to be lost due to disaster or demolition or because of damage or condemnation or through conversion to nonresidential use.

Rows 5-10 classify rental units by total monthly housing costs, while rows 11-15 track rental units by household income.[11] Loss rates declined uniformly from no cash rent units (3.7 percent) to units with monthly housing costs of $1,250 or more (0.8 percent),

[11] 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 2003 and 2005. 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).

and from units rented by households with incomes less than $15,000 (2.4 percent) to households with incomes of $100,000 or more (0.3 percent).

Rows 16-20 classify owner-occupied units by total monthly housing costs, while rows 21-25 track owner-occupied units by household income. Loss rates declined almost uniformly from units with monthly housing costs of less than $350 (1.2 percent) to units with monthly housing costs of $1,250 or more (0.3 percent), and from units owned by households with incomes less than $15,000 (1.0 percent) to households with incomes of $100,000 or more (0.3 percent).

Backward-Looking Analysis – Table 1

Table 1 focuses on the general housing characteristics of the stock. Row 1 provides the highest level CINCH overview of the stock. For this row, column A specifies no conditions other than being part of the stock in the relevant year. Overall, the rate of total additions was 4.1 percent, the new construction rate was 2.9 percent, and the other additions rate was 1.2 percent. On average, 41 out of every 1,000 units in the 2005 stock were not part of the stock in 2003, 29 of the 41 were newly constructed, and 12 of the 41 were units that returned to the stock. The rate of other additions in 2005 is smaller than the loss rate in 2003; therefore, without new construction, the housing stock would have declined between 2003 and 2005.

The largest source of other additions was the “other reasons” category that includes (a) units that were listed in 2003 as condemned or uninhabitable because of physical problems or as lost for unclassified reasons, and (b) units that were added for unclassified reasons or as sample adjustments. The second largest source of other additions was the “houses or mobile homes moved in” category.

Rows 2-4 divide the housing stock by use. The rate of total additions was substantially higher among vacant and seasonal units (8.7 and 7.4 percent, respectively) than among occupied units (3.4 percent). Seasonal units were 6 times more likely to be converted from nonresidential use than the typical unit in the stock; vacant units were 4 times as likely.

Rows 5-12 divide the housing stock by type of structure to determine what type of units account for additions. Single-unit, attached structures, units in structures with 50 or more units, and mobile homes all had rates of total additions between 6.5 and 7.0 percent. The rate of new construction was highest for single-unit attached structures (5.5 percent) followed by single-unit, detached structures (3.3 percent). The “mobile home moved in” category accounted for the largest number of mobile home additions. Units in structures containing 5 to 9 units had the lowest rate of total additions, 1.8 percent, followed by units in structures containing 10 to 19 units, 2.9 percent.
Units in structures containing two to four units were 6 times more likely to be added through conversions and mergers than the typical unit. Units in structures containing 50 or more units were almost 7 times more likely to be added from nonresidential use than

the typical unit. These patterns are the mirror image of the patterns for losses in forward-looking Table 1.

Rows 13-26 divide the housing stock by year built. Column I shows a few newly constructed units in every year-built period, probably because of errors in recording unit status or in reporting or recording the year built.[12] The rate of other additions is highest during the periods of 2000-2004 (2.1 percent), 1995-1999 (1.6 percent), and 1919 or earlier (1.5 percent).

Rows 27-36 and 37-41 divide the housing stock by two measures of interior space: the number of rooms and the number of bedrooms. One- and two-room units and one-bedroom units have high rates of total additions (17.5 percent, 9.0 percent, and 14.9 percent, respectively), primarily because of high rates of other additions (16.8 percent, 7.4 percent, and 13.5 percent respectively). One-room units were 34 times more likely to be added from nonresidential use than the typical unit, and two-room units were 12 times more likely. The highest rates of new construction were in 8-, 9-, and 10-room units—4.8 percent, 5.6 percent, and 5.6 percent, respectively.

Rows 42-47 focus on multiunit structures only, and divide them by number of stories. Multiunit structures have a lower rate of total additions than the typical unit (3.6 percent vs. 4.1 percent), primarily because of a lower rate of new construction (2.0 percent vs. 2.9 percent). Units in buildings with four to six stories were 3.7 times more likely to result from mergers and conversions than the typical unit, and units in buildings with seven or more stories were 5.5 times more likely to be additions from nonresidential use.

Rows 48-51 divide the housing stock by the four Census regions. The West had the highest rate of new construction (3.6 percent), but the South had the highest rate of total additions (5.1 percent). The Northeast had the lowest rate of total additions, 2.5 percent.

Rows 52-55 divide the housing stock between central city, suburban, and non-metropolitan residences. The CINCH weights overestimate the number of units located outside metropolitan areas by 10 percent. Units outside metropolitan areas had by far the highest rate of total additions (9.5 percent), due to very high rates of new construction (7.5 percent) and other additions (2.0 percent). Surprisingly, suburbs had the lowest rate of total additions (1.1 percent) and the lowest rate of new construction (0.4 percent). The AHS uses definitions of metropolitan areas developed after the 1990 census. Some of the new construction recorded as non-metropolitan may have taken place in the suburban portions of metropolitan areas as defined after the 2000 census.

[12] This report uses REUAD=3 from the 2005 survey and 10≤NOINT≤11 from the 2003 survey, not year built, to identify new construction. REUAD is the AHS variable for "reason unit got added to sample"; REUAD=3 is "new construction." NOINT is the AHS variable for reason unit not interviewed; NOINT=10 is "permit granted, construction not started," and NOINT=11 is "under construction, not ready." REUAD and NOINT are variables entered by the Census Bureau; they are not based on information provided from respondents. Respondents provide the information on year-built.

Rows 56-57 identify units housing recent movers in 2005 from those with longer term occupants. As expected, units with occupants who moved in during 2004 or 2005 had a higher rate of new construction, 3.8 percent.

Backward-Looking Analysis – Table 2

This table looks at issues related to the physical quality of units. Row 1 repeats row 2 in Table 1. All the subsequent rows are subsets of row 1 where the rate of total additions was 3.4 percent, the new construction rate was 2.7 percent, and the other additions rate was 0.8 percent.

Rows 2-3 look at whether the units have complete kitchens, that is, have an installed sink with piped water, a mechanical refrigerator, and built-in burners for the exclusive use of the occupants. Rows 4-5 look at whether the units have complete plumbing facilities, that is, hot and cold piped water, a flush toilet, and a bathtub or shower inside the structure, all for the exclusive use of the occupants. Rows 6-9 look at each of these plumbing requirements separately. Rows 2-3, 4-5, and 6-9 separate out good units from the least desirable units based on kitchen and bath equipment and compare how the units changed over the period.

In 2005, 98.4 percent of occupied units have complete kitchens. Of the 1,558,000 units without complete kitchens in 2005, 33,000 were newly constructed and another 44,000 were other additions. Only 163,000 units lacked a complete kitchen in both 2003 and 2005, a persistence percentage of 11.0 percent. Most (89.0 percent) of the units without complete kitchens in 2005 had complete kitchens in 2003 or were not occupied in 2003. Respondent errors and equipment failures probably account for this surprisingly large percentage.

In 2005, 98.8 percent of occupied units have complete plumbing. Of the 1,308,000 units without complete plumbing in 2005, 8,000 were newly constructed and another 31,000 were other additions. Only 102,000 units lacked complete plumbing in both 2003 and 2005—a persistence percentage of 8.0 percent. Most (92.0 percent) of the units without complete plumbing in 2005 had complete plumbing in 2003 or were not occupied in 2003. Again, respondent errors and equipment failures probably account for this surprisingly large percentage.

Rows 10-15 look at how units obtain water and dispose of sewage. The rates of total additions for units that use a well for water equals that for all occupied units, while the rate for units that use a septic tank or cesspool for sewage disposal is somewhat higher (4.0 vs. 3.4 percent).

Rows 16-21 look at units with severe physical problems. Rows 17-21 identify specific types of serious deficiencies. Row 16 counts the units having one or more of these deficiencies. In 2005, 1.9 percent of the occupied units had serious deficiencies. Of these units occupied in both years, only 9.6 percent of those with severe physical problems in 2005 had had severe physical problems in 2003. Severe electrical problems

were minor but persistent. Only 0.1 percent of the 2005 housing stock had severe electrical problems, but the persistence rate was 46.0 percent.

Rows 22-27 look at units with moderate physical problems. Rows 23-27 identify specific types of deficiencies. Row 22 counts the units having one or more of these deficiencies. In 2005, 3.8 percent of the units had moderate deficiencies. Of those occupied in both years, 34.5 percent of those with moderate physical problems in 2005 had had moderate physical problems in 2003. Moderate heating problems were the most persistent. Of the 2005 housing stock, 1.2 percent had moderate heating problems but the persistence rate was 82.9 percent.

Backward-Looking Analysis – Table 3

This table pertains to the characteristics of occupants. Row 1 repeats row 2 in Table 1. All the subsequent rows are subsets of row 1 where the rate of total additions was 3.4 percent, the new construction rate was 2.7 percent, and the other additions rate was 0.8 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. The rate of total additions and the rate of new construction declined with the age of the householder and were lower for households with some children. Among the racial and ethnic categories, the rate of total additions and the rate of new construction were highest for units with Asian householders, followed by units with householders of two or more races. These rates were lowest for units with households who were Black and Hispanic. Overall, units with Hispanic householders had higher than average rates of total additions and new construction, while units with Black householders had lower than average rates.

Persistence levels were high for the rows defined by race and ethnicity. Of the units that were occupied by White householders in 2005 and that were occupied in 2003, 90.7 percent were occupied by White householders in 2003. The persistence rate for Black householders was 77.1 percent; the percentage for Hispanic householders was 74.6 percent.

Backward-Looking Analysis – Table 4

Table 4 pertains to tenure, income, and housing costs. Row 1 repeats row 2 in Table 1. All the subsequent rows are subsets of row 1 where the rate of total additions was 3.4 percent, the new construction rate was 2.7 percent, and the other additions rate was 0.8 percent.

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 augmented by additions. Rental units had a new construction rate of 1.6 percent

compared with 3.1 percent for owner-occupied units. Mergers and conversions were much more likely among renter-occupied units, 2.2 times the rate for occupied units. Rental units were also 2.3 times more likely to result from the transformation of nonresidential space.

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.

Higher cost units and units occupied by higher income households have higher rates of new construction. The new construction rate for rental units with monthly housing costs of $1,250 or more was 3.7 percent. The new construction rate for owner-occupied units with monthly housing costs of $1,250 or more was 5.5 percent. No-cash-rent units had a high rate of other additions, 3.8 times the rate for the occupied units. Rental units occupied by households with incomes of $100,000 or more had a 4.2 percent new construction rate. Owner-occupied units occupied by households with incomes of $100,000 or more had a 4.3 percent new construction rate.

Where Did the 2005 Housing Stock Come From?

The section on Weighting Issues explained 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.

Taken together, new construction, other additions, and losses amount to 6,936,000 units. The discrepancy that results from trying to track the stock from 2003 to 2005 or from 2005 to 2003 is 431,000, only 6.2 percent of the total flows into and out of the stock. With this in mind, Table A tracks the stock from 2003 to 2005 using the numbers from our forward-looking and backward-looking analyses.

The starting point is row B, the CINCH estimate of the housing stock in 2003, which has been adjusted to equal the published AHS estimate in row A. The ending point is row O, the published estimate of the housing stock in 2005. The change in the housing stock between those two years is 3,600,000 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 3,202,000.

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. Losses exceeded additions by 103,000.

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 197,000 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.

Table A: CINCH Derivation of 2005 Housing Stock Using 2003 Base

A	2003 Housing Stock: Published estimate	120,777,000	
B	2003 Housing Stock: Forward-looking Estimate	120,777,000	
C	Units Lost by Demolition or Disaster	399,000	Net of C & D
D	Units Added by New Construction	3,601,000	3,202,000
E	Units Lost from Mergers or Conversions	146,000	Net of E & F
F	Units Added by Mergers or Conversions	43,000	-103,000
G	House or Mobile Home Moved Out	245,000	Net of G & H
H	House or Mobile Home Moved In	442,000	197,000
I	Units Lost to Nonresidential Use	278,000	Net of I & J
J	Units Added from Nonresidential Use	395,000	117,000
K	Units Badly Damaged or Condemned	274,000	Net of K, L, & M
L	Units Lost in Other Ways	543,000	
M	Units Added from Temporary Losses or Other Reasons	572,000	-245,000
N	Estimate of 2005 Housing Stock based on 2003 base (N=B-C+D-E+F-G+H-I+J-K-L+M)	123,946,000	Difference
O	2005 Housing Stock: Published Estimate	124,377,000	431,000

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 addition of 117,000 to the stock.

Rows K, L, and M 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 245,000 units to the stock.

Combining all the additions and losses in rows C through M to the beginning stock produces an estimate of 123,946,000 in the 2005 housing stock. This estimate is 431,000 less than the actual housing stock in 2005. This is the discrepancy mentioned in the second paragraph of this section.

Similarly, one could track the 2005 stock backward to 2003 using CINCH estimates. All the numbers in rows C through M would be the same and the end result would be an estimate of the 2003 stock that would be 431,000 too large.[13]

[13] 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 though K in the forward-looking analysis and columns D through J in the backward-looking analysis) 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 1 are a disaggregation of the total stock in row 1. Similarly, rows 7 (Whites), 10 (Blacks), 13 (American Indians, Eskimos, & Aleuts), 14 (Asian), 15 (Pacific Islanders), and 16 (two or more races) in Table 3 are a disaggregation of row 1 (occupied households). In these cases, there should be equality between the parent row and the sum of the break-out rows for all columns except D and E. The difference between column D in the parent row and the sum of column D for the break-out rows should equal the negative of the difference between column E in the parent row and the sum of column E for the break-out rows. In every case, 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 15.2 percent in the forward-looking analysis and by 10.3 percent in the backward-looking analysis. These overestimates of non-metropolitan housing probably account for some other mismatches, such as a modest overestimation of the number of units with householders aged 65 and older. 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 14 percent in the forward-looking analysis and by 17 percent in the backward-looking analysis. The CINCH weights underestimate owner-occupied units with monthly housing costs less than $350, and overestimate owner-occupied units with monthly housing costs of $1,250 or more. The correlation between the errors in the forward-looking and backward-looking analyses was 0.84.

Appendix B – Weighting

CINCH separates the AHS samples in 2003 and 2005 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 2003 housing stock but are not part of the 2005 housing stock (LOSSES), and units that are not part of the 2003 housing stock but are part of the 2005 housing stock (ADDITIONS). ADDITIONS are split into NEW CONSTRUCTION and OTHER ADDITIONS (structures that existed in 2003 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 2003 and those ADDITIONS that were interviewed in 2005.

For the forward-looking analysis, we started with the AHS pure weights. We used the AHS weighted count in 2005 of LOSSES to create new pure weights for interviewed LOSSES. We used the AHS published count in 2003 of the stock 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 2003. 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 2005 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 2005 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 2005. These matches were performed separately for mobile homes and all other structure types.

The Census Bureau dropped half of the mobile home sample between 2003 and 2005 and replaced those units with new units. Because neither the dropped nor added mobile homes were interviewed in both years, they had to be dropped from the sample. This required adjusting the pure weights for the mobile homes that were in both surveys prior to all the adjustments described above.

The logic behind the weighting and the procedures used to create the weights is explained in *Weighting Strategy For 2003-2005 CINCH Analysis*.