

COMPONENTS OF INVENTORY CHANGE: 2011-2013



American Housing Survey

Components of Inventory Change: 2011–2013

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Components of Inventory Change: 2011–2013

Executive Summary

The Components of Inventory Change (CINCH) analysis reported in this document uses the American Housing Surveys (AHS) of 2011 and 2013 to explain how the American housing stock evolved in the period between the two surveys.

This report does four things:

- Identifies and measures the mechanisms through which units in the housing stock in 2011 were lost by 2013 and the mechanisms through which new units were added to the housing stock by 2013.
- Compares the losses and additions between the 2011 and 2013 surveys to the losses and additions experienced in the five preceding 2-year periods between 2001 and 2011.
- Identifies segments of the housing stock that encountered unusually large losses or additions between the 2011 and 2013 AHS surveys.
- Describes in Appendix B all the changes that occurred between the 2011 and 2013 surveys in each of 123 overlapping segments of the housing market, including the losses of units to other segments and additions from other segments.

Changes in the Housing Stock Between 2011 and 2013

- The housing stock increased by 413,000 housing units between the 2011 and 2013 AHS surveys. In the same period, the number of households (occupied housing units) increased by 987,000.
- A total of 1,567,000 units were lost and 1,837,000 units were added between the surveys. Adjustment in the AHS weights accounted for an additional 144,000 growth in units. Combined, 3,549,000 units were added or subtracted to the housing stock. In absolute value, the gross flows were 8.6 times larger than the net change.
- Demolitions and losses to fires and natural disasters accounted for 470,000 losses, 30 percent of the 1,567,000 losses. Units left the stock in 5 other ways: mobile homes were moved from their 2011 locations (161,000), 2011 units were reconfigured into larger or smaller units (98,000), 2011 units were used for nonresidential purposes in 2013 (202,000), 2011 units fell into disrepair and became uninhabitable by 2013 (212,000), and 2011 units were lost for a variety of other unclassified reasons (424,000).¹

¹ The “other” classification is used when the Census Bureau discovers that a unit that was occupied or potentially available for occupancy at the time of the last survey is no longer there or no longer potentially available for occupancy and either the Census Bureau cannot determine what happened or what happened does not fit into any of the other categories. An unusual example of “not fitting into any of the other categories” would be a tent or boat that was classified as a housing unit in the previous survey but is no longer in the same location. Most likely “cannot determine” is the main reason that losses are listed as “other.”

- New construction and the manufacture of new mobile homes accounted for 63 percent of all units added to the stock, 1,160,000 of 1,837,000 units. Units entered the stock in 5 other ways: mobile homes were moved into new locations in 2013 (94,000), new units were created by reconfiguring 2011 units into larger or smaller units (72,000), units were recovered from nonresidential use (245,000), previously uninhabitable units were repaired (141,000), and units were added by a variety of other means (125,000).²

Comparison to Previous Periods

The changes described above were compared to similar changes in the five 2-year periods between the 2001 AHS survey and the 2011 AHS survey.

- The 413,000 growth in the housing stock between the 2011 and 2013 AHS surveys was by far the smallest growth recorded during the 6 periods. The next smallest change was 1,909,000 between the 2007 and 2009 AHS surveys; the largest change was 3,827,000 between the 2005 and 2007 AHS surveys.
- Additions through new construction and the manufacture of mobile homes were also at the lowest level in the 2011–2013 period, at 1,160,000. The next smallest change was 2,057,000 between the 2007 and 2009 AHS surveys; the largest change was 3,601,000 between the 2003 and 2005 AHS surveys.
- Both net additions to the housing stock and new construction roughly tracked the economy from 2001 through 2011. The economy peaked in June 2007, then fell into a severe recession from June 2007 to December 2009 when the current lackluster recovery began. Net additions peaked between 2005 and 2007, declined sharply in the 2007–2009 period, and recovered somewhat in the 2009–2011 period. New construction peaked between 2003 and 2005. The decline in new construction began in the 2005–2007 period because the financial crisis preceded the recession. Despite a reviving economy, new construction continued to trend downward through the 2009–2011 period, probably because of the slow return of the mortgage market to normal functioning.
- The large declines in both new construction and net additions during the 2011–2013 period were out of sync with the gradually improving economy. Comparing the 2007–2009 and 2011–2013 periods, net additions fell by 1.5 million and new construction fell by 1.4 million.
- The absolute sum of all the factors that produce changes in the size of the housing stock rose from 6.3 million units in the 2001–2003 period; peaked at 8.4 million units in the 2005–2007 period; and fell successively in the 2007–2009, 2009–2011, and 2011–2013 periods, to 6.1 million, 5.7 million, and 3.5 million units, respectively. The ratio of total flows to net additions varied between 2.0 and 3.2 in the 2001–2011 timeframe, then increased to 8.6 in the 2011–2013 period.

² As with losses, the “other” category for additions is used when the Census Bureau cannot determine how a unit entered the housing stock or the reason does not fit any into any of the categories for additions.

Components With Unusually Large Losses or Additions, 2011–2013

Appendix B reports additions and losses by type for 123 segments of the housing stock; these components divide the housing stock by features such as occupancy status, size of unit, location, quality, tenure, and characteristics of resident households. This document identifies segments with addition or loss rates that are both substantially larger or smaller and statistically different from overall rates of additions or losses.

For 55 of the 123 components, the AHS collects data on all housing units. The addition and loss rates for these components are compared to those of the overall stock. The 2011 housing stock lost 1.2 percent of its units; 1.4 percent of the 2013 housing stock were new additions.

The report found the following patterns among these 55 segments:

- Units used for seasonal purposes experienced substantially higher rates of losses (5.4 percent) and additions (2.8 percent) than the overall housing stock, indicating a high rate of turnover among seasonal units.
- Vacant units also had high rates of losses (4.6 percent) and additions (3.5 percent). Vacancy may be a stage before demolition or other type of loss. The high rate of new additions most likely reflects the time need to market additions to the stock.
- Losses and additions affected the composition of the housing stock by type of structure. Manufactured/mobile homes and units in structures with two to four units had high loss rates, 3.8 and 1.9 percent respectively. Single-family attached units and units in buildings with 50 or more units had high rates of additions, 2.6 and 3.2 percent respectively.
- Small units experience high turnover. The loss rates were higher than average for one-room (8.0 percent), two-room (8.4 percent), and three-room (2.0 percent) units and units with no bedrooms (7.9 percent) and one bedroom (2.0 percent). The rates of addition were higher than average for one-room (11.1 percent), two-room (6.6 percent), and three-room (2.1 percent) units and units with no bedrooms (7.1 percent) and one bedroom (2.0 percent).

For 68 components, the AHS collects data only on occupied units. The addition and loss rates for these components are compared to those of the occupied stock. The occupied 2011 housing stock lost 0.6 percent of its units, statistically less than the overall stock. New additions composed 1.1 percent of the 2013 housing stock; this rate was not statistically different from the overall stock.

The report found the following patterns among these 68 segments:

- Low-quality units had higher-than-average loss rates. Among occupied units, loss rates were high for those with severe physical problems (1.7 percent) or moderate physical problems (1.8 percent).
- Lower cost units experienced high loss rates. Among renter-occupied units, the rates were 1.7 percent for those with no cash rent, 1.0 percent for those with gross rents less than \$350 per month, 1.9 percent for those with gross rents between \$350 and \$599, and 1.0

percent for those with gross rents between \$600 and \$799. Among owner-occupied units, the rate was 1.2 percent for those with monthly housing costs less than \$350.

- High-cost units had higher-than-average rates of addition. Among both renter-occupied and owner-occupied units, addition rates were 1.6 percent for those with monthly housing costs of \$1,250 or more.
- Loss rates and rates of additions varied by household income in a manner consistent with the pattern by housing costs.
 - Rental units occupied by households with incomes less than \$15,000 or between \$15,000 and \$29,999 had high loss rates, 1.2 and 1.1 percent respectively. Units occupied by high-income owner households with annual incomes between \$50,000 and \$99,999 or of \$100,000 or more had loss rates of 0.3 percent each.
 - Units occupied by households with annual incomes of \$100,000 or more had high rates of addition, 2.0 percent for renter-occupied units and 1.6 percent for owner-occupied units.
 - Units whose occupants reported welfare income in 2011 experienced a loss rate of 1.6 percent.
- Only two other components differentiated by household characteristics had noteworthy loss rates. Units with Black householders in 2011 had a higher-than-average loss rate (1.0 percent), while those with Asian householders had a lower-than-average loss rate (0.3 percent).

Neither loss rates nor rates of addition varied by region of the country, and the only noteworthy loss rate by metropolitan status was a higher-than average rate for units in nonmetropolitan areas (2.0 percent).

Components of Inventory Change: 2011–2013

I. Introduction

The U.S. Department of Housing and Urban Development (HUD) and the Census Bureau conduct an extensive survey of the American housing stock called the American Housing Survey (AHS). The AHS drew a sample of approximately 50,000 housing units in 1985 and has been interviewing these units at 2-year intervals. New units have been added to the AHS every 2 years to account for new construction or other additions to the housing stock, and these units have also been interviewed every 2 years. The consistent tracking of the same housing units makes it possible to provide a detailed picture of how the American housing stock evolves.

For a number of years, HUD has conducted Components of Inventory Change (CINCH) studies to detail the survey-to-survey changes in the American housing stock. This paper continues the CINCH series by describing how the housing stock evolved between 2011 and 2013; it is organized as follows:³

- Section II explains the changes in the housing stock between 2011 and 2013 in terms of losses to the housing stock through demolitions or other ways units can leave the housing stock and new construction and other ways units can enter the housing stock.
- Section III compares the pattern of changes between 2011 and 2013 to the pattern of changes in previous 2-year periods with an eye on the effects of the recent financial crisis and severe recession.
- Section IV looks at components of the housing stock that experienced losses or additions that were markedly different from the overall patterns of losses or additions.

The paper concludes with a series of appendixes that contain analysis and data found in previous CINCH reports:

- Appendix A explains the CINCH methodology in detail and explains why the forward-looking and backward-looking analyses are not 100-percent consistent.
- Appendix B contains the four forward-looking tables and the four backward-looking tables found in previous reports.
- Appendix C discusses the consistency checks applied to the data and gives an overview of the weighting techniques used in CINCH analysis.

While this paper repeats the analysis contained in previous CINCH studies, it features a new reconciliation between the forward-looking and backward-looking analyses that appears at the end of Section II.

³ For previous CINCH studies, see <http://www.huduser.org/portal/datasets/cinch.html>.

II. Overall Changes in the Housing Stock: 2011–2013

One typically thinks of the housing stock evolving through two mechanisms: the construction of new units and the demolition of old units. While new construction and losses through demolition and natural disasters are the primary means by which the housing stock changes, CINCH shows that there are other important engines of change.

Table 1: Disposition of 2011 Housing Units in 2013⁴

2011 housing stock	132,419,000
2011 units present in 2013	130,852,000
Units no longer in the stock	1,567,000
2011 house or mobile home moved out	161,000
2011 units lost due to conversion/merger	98,000
2011 units lost through demolition or disaster	470,000
Permanent losses	729,000
2011 units changed to nonresidential use	202,000
2011 units badly damaged or condemned	212,000
Temporary losses	415,000
2011 units lost in other ways	424,000

Between 2011 and 2013, 1,567,000 units left the housing stock (Table 1). Of these, 729,000 are permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 415,000 are temporary losses—the original unit needs repairs or is being used for other purposes. These units may or may not return to the housing stock. Finally, there were 424,000 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations.

Demolition and disasters were the most important causes of losses to the stock, but these causes accounted for only 30 percent of all losses. Another important source of permanent losses was the movement from one location to another of mobile homes or occasionally of houses. The movement of a mobile home or house is considered a permanent loss because a housing unit is a combination of land and capital. While movement preserves the capital, it dissolves the union of capital and land that formed the original unit. “Conversion” is the terminology used in the AHS for the splitting of a unit into two or more units. This transformation is the opposite of a merger, which involves the combining of two or more units into one unit. Permanent losses accounted for 46.5 percent of the units that were in the 2011 housing stock but not in the 2013 stock.

Sometimes houses are used for business purposes. These commercial uses or the use of a house for a group home is considered a change to a nonresidential use. Badly damaged units are units that are open to the elements or have been declared unsafe by a local government. These units may be repaired, left in an unusable state, or demolished. Recoverable losses accounted for 26.5 percent of the units that were in the 2011 housing stock but not in the 2013 stock. The “other” category consisted of 424,000 units, 27.1 percent of all losses.

⁴ Numbers may not add consistently due to rounding.

Table 2 lists various additions to the housing stock: 1,837,000 units were added between the 2011 and the 2013 AHS surveys. Of these, 1,160,000 (63.1 percent) were newly constructed units or newly manufactured mobile homes. Approximately 94,000 mobile homes (5.1 percent) were moved to new locations, creating a new union of capital and land. Changes in 2011 in how Census Bureau field staff report the movement of mobile homes into new sites may have resulted in an underestimate of these movements.⁵ Another 72,000 units (3.9 percent) resulted from the merger of 2 or more units or the split of a unit into 2 or more units. New construction or other additions that involved relocation or reconfiguration of residential units accounted for 72.2 percent of all additions.

Table 2: Sources for the 2013 Housing Stock⁶

2013 housing stock	132,832,000
2013 units present in 2011	130,997,000
Total additions to stock	1,837,000
2013 units added by new construction	1,160,000
2013 house or mobile home moved in	94,000
2013 units added by conversion/merger	72,000
New or reconstructed units	1,326,000
2013 units added from nonresidential use	245,000
2013 units added from temporary losses	141,000
Recovered units	386,000
2013 units added in other ways	125,000

We classified 386,000 units (21.0 percent of all additions) as recovered because these units had been in the housing stock at some point but were classified in 2011 as either nonresidential or temporary losses. Of these, 245,000 units (13.3 percent) were used for either commercial purposes or for institutional housing in 2011, and 141,000 units (7.7 percent) were listed in 2011 as temporary losses because occupancy had been prohibited or the unit was open to the elements. Finally, 125,000 units (6.8 percent) were added in other unclassified ways.

Netting out Additions and Losses

One naturally wants to combine Tables 1 and 2 to produce a coherent story of how the housing market evolved between 2011 and 2013. The parallelism between the types of losses reported in Table 1 and the types of gains reported in Table 2 adds to the allure of integrating the two analyses. This section carries out such a reconciliation but begins with an explanation of why any such reconciliation will be imperfect.

The second line in both Tables 1 and 2 enumerates units that were present in both the 2011 and the 2013 housing stock. One would expect these two estimates to be identical, especially in light of the fact that both estimates are based on the same sample units. The estimates differ by

⁵ In the 2013 AHS, the Census Bureau classified only 10 units as REUAD = 4 (mobile home move-in) and no units as REUAD = 5 (house moved in). The 94,000 count in Table 2 is a weighted combination of units where REUAD = 4 and mobile home units on land that was classified as a vacant mobile pad in 2011.

⁶ Numbers may not add consistently due to rounding.

144,000 because the AHS weights are adjusted between surveys to produce the most accurate portrayal of the housing stock in each year. Appendix A explains why this variation in weights necessitates separating CINCH into a forward-looking analysis to itemize losses and a backward-looking analysis to itemize additions to the stock. The change in weights accounts for 144,000 of the increase in the stock between 2011 and 2013. While this sum is only slightly more than one-tenth of 1 percent of the 2013 stock, it represents over a third of the 413,000 increase in the housing stock between surveys.

Table 3 traces the change in the housing stock between 2011 and 2013 by combining Tables 1 and 2; it explicitly recognizes the impact of the change in weights between surveys. As expected, the two factors having the biggest impact on the size of the housing stock are new construction and losses through demolition and natural disasters. If these were the only 2 forces affecting the housing stock, the 2013 housing stock would have been 690,000 units larger than the 2011 housing stock, rather than just 413,000. Focusing only on new construction and losses from demolitions and natural disasters fails to capture all the dynamics of the housing market.

Other mechanisms offset the net increase from construction over demolition. Four of the other mechanisms are straightforward:

- Decreases from losing units to conversions or mergers exceed increases from adding units through conversions and mergers by 26,000 units.
- 71,000 more units fell into disrepair than were recovered through repairs.
- 42,000 more units were recovered from nonresidential use than entered into nonresidential use.
- 299,000 more units were listed as lost for “other” reasons than were listed as added for “other” reasons.

These 4 mechanisms reduced the net gain from construction over demolition from 690,000 to 336,000 units, well below the reported 413,000 overall gain. A fifth mechanism—the movement of mobile homes from one location to another—resulted in a further decline of 67,000 units. This finding requires some interpretation; there are not 67,000 mobile homes lost in transit. The Census Bureau records that a mobile home has moved out whenever it finds that a mobile home site from the previous survey is now vacant. Also, the Census Bureau records a mobile home has moved in whenever it finds that a site that was vacant in the previous survey now has a mobile home or whenever new mobile home sites are added to the sample. The two processes are separate and may not result in consistent numbers. The “missing” 67,000 mobile homes are probably some combination of the following: mobile homes being moved to sites that were not previously identified as vacant mobile home sites and mobile homes being moved into sites previously occupied by other mobile homes that are subsequently demolished. The first alternative suggests an undercounting of mobile home additions and subsequently the housing stock; the second alternative suggests an undercounting of demolitions but not the housing stock. A third alternative is inconsistent reporting of mobile home movements. Taking into account these movement of mobile homes, the net gain is now 270,000. The change in weights added 144,000; with this addition, with rounding the total now equals the reported 413,000 increase in the housing stock.

Table 3: Additions and Losses to the Housing Stock by Type, 2011–2013

Present in 2013	132,832,000	Share of net addition	Share of total flows
Present in 2011	132,419,000		
Net addition to the housing stock	413,000		
2011 units lost through demolition or disaster	-470,000		13.2%
2013 units added by new construction	1,160,000		32.7%
Net additions through construction and demolitions	690,000	167.1%	
2011 house or mobile home moved out	-161,000		4.5%
2013 house or mobile home moved in	94,000		2.6%
Net additions through movement of mobile homes	-67,000	-16.2%	
2011 units lost due to conversion/merger	-98,000		2.8%
2013 units added by conversion/merger	72,000		2.0%
Net additions through conversions and mergers	-26,000	-6.3%	
2011 units changed to nonresidential use	-202,000		5.7%
2013 units added from nonresidential use	245,000		6.9%
Net additions through movement into and out of nonresidential use	42,000	10.2%	
2011 units badly damaged or condemned	-212,000		6.0%
2013 units added from temporary losses in 2011 stock	141,000		4.0%
Net additions through damage and repairs	-71,000	-17.2%	
2011 units lost in other ways	-424,000		11.9%
2013 units added in other ways	125,000		3.5%
Net unclassified additions	-299,000	-72.4%	
Net additions accounted for by change in weights	144,000	34.9%	4.1%
Net unclassified or due to changes in weights	-155,000		
Total inflows and outflows plus impact of change in weights	3,549,000	100.0%	100.0%

By pulling together the various ways units are added to or lost from the housing stock, Table 3 calls attention to an important aspect of housing market dynamics. Because changes in the size of the housing stock are the result of several offsetting flows, the observed change—an increase of 413,000 units—is far less than the absolute sum of the various inflows and outflows. During the 2011 to 2013 period, the flows totaled 3,549,000 units, 8.6 times the net increase. Viewed in terms of all the flows, the impact of changes in weights is relatively minor, only 4.1 percent of all flows.

III. Comparison With Recent CINCH Analyses

Table 3 contained the first reconciliation of forward-looking and backward-looking analyses presented in any of the published CINCH reports. Table 4 extends this reconciliation to the six pairwise CINCH analyses covering the seven AHS surveys from 2001 to 2013.

While the housing stock increased throughout the period, the size of the increase varied greatly, ranging from a high of 3.8 million units in the 2005–2007 period to a low of 0.4 million units in the 2011–2013 period. The state of the economy appears to have had some impact on the growth of the housing stock. The National Bureau of Economic Research breaks the 2001–2013 period into four economic cycles: a brief recession from a peak in March 2001 to a trough in November 2001, a vigorous economic expansion through a peak in December 2007; a severe recession ending in June 2009; and the current lackluster recovery. Net additions to the stock appear to have tracked the economy through 2011, growing strongly from 2001 through 2007, then falling sharply through 2009, and ending with a modest increase through 2011. The 2011–2013 experience is not consistent with the preceding pattern; despite an improving economy between 2011 and 2013, the increase in the housing stock dropped to only 413,000 units.

The second line from the bottom in Table 4 reports the absolute value of all flows into and out of the housing stock during each of the six periods including the impact of the change in AHS weights between surveys. Gross flows displayed the same trend as net additions, rising from 6.3 million units in the 2001–2003 period to a high of 8.4 million units in the 2005–2007 period, then declining sharply to a low of 3.5 million in the 2011–2013 period. Throughout the period, gross flows were substantially larger than net additions. The drop in gross flows in the 2011–2013 period was not as precipitous as the drop in net additions. The ratio of gross flows to net additions ranged between 2.0 and 3.2 in the first five periods but then accelerated sharply to 8.6 in the 2011–2013 period.

Table 4: Additions and Losses by Type in Recent CINCH Analyses (all numbers in thousands)

Period	2001–2003	2003–2005	2005–2007	2007–2009	2009–2011	2011–2013
Present in end year	120,777	124,376	128,203	130,112	132,419	132,832
Present in base year	118,195	120,777	124,376	128,203	130,112	132,419
Net addition to the housing stock	2,582	3,599	3,827	1,909	2,307	413
units lost through demolition or disaster	-382	-399	-635	-491	-519	-470
units added by new construction	3,137	3,601	3,250	2,547	2,057	1,160
Net additions through construction and demolitions	2,754	3,203	2,616	2,056	1,538	690
house or mobile home moved out	-231	-245	-405	-411	-242	-161
house or mobile home moved in	66	442	840	470	173	94
Net additions through movement of mobile homes	-164	197	434	59	-68	-67
units lost due to conversion/merger	-131	-146	-275	-193	-100	-98
units added by conversion/merger	519	43	146	287	73	72
Net additions through conversions and mergers	388	-103	-129	94	-27	-26
units changed to nonresidential use	-354	-278	-262	-288	-255	-202
units added from nonresidential use	291	395	279	261	183	245
Net additions through movement into and out of nonresidential use	-63	117	17	-27	-72	42
units badly damaged or condemned			-318	-302	-211	-212
units added from temporary losses			150	168	226	141
Net additions through damage and repairs			-168	-134	15	-71
units lost in other ways	-760*	-817*	-387	-400	-371	-424
units added in other ways	436*	572*	530	62	134	125
Net unclassified additions	-324*	-245*	143	-338	-238	-299
Net additions accounted for by change in weights	-9**	430	914	199	1,160**	144
Net unclassified or due to changes in weights	-333	185	1,056	-140	922	-154
Total inflows and outflows plus impact of change in weights	6,298	7,367	8,391	6,078	5,704	3,549
Net change in households (occupied housing units)	407	3,029	1,821	1,114	3,101	987

* In the 2001–2003 and 2003–2005 periods, “other” includes badly damaged or condemned and added from temporary losses.

** Affected by change in the decennial counts used by the Census Bureau to adjust weights.

Units added through new construction peaked at 3.6 million units in the 2003–2005 period and then declined steadily to less than 1.2 million units in the 2011–2013 period.⁷ New construction began to decline in the 2005–2007 period because the financial crisis began before the recession. Demolitions rose from roughly 400,000 units in the first 2 periods to 635,000 units in the 2005–2007 period, then fell to approximately 500,000 units in the last 3 periods. Demolitions were substantially smaller than new construction and more stable across the six periods.

The AHS allows us to compare how other factors affected the size of the housing stock over this same timeframe. Table 4 reports mobile home flows, losses and additions through conversions and mergers, movements into and out of nonresidential use, movements into and out of disrepair, and other losses and additions. The next four paragraphs discuss how these other flows varied over time, but the discussion is speculative. The numbers in Table 4 are based on two AHS variables: NOINT (reason unit was not interviewed) and REUAD (reason unit added to sample). While the Census Bureau has recorded demolitions and losses due to fires and natural disasters and new construction with a high degree of accuracy, its ability to distinguish among the other types of losses and additions has varied over time. Thus, some of the observed period-to-period variability in Table 4 may be due to quirks in how the data are collected.

The movement of mobile homes varied greatly across periods. The loss of mobile homes through moves followed the course of the general economy, rising in the first three periods and falling at the end. However, the recession of the 2007–2009 period saw a modest increase over the 2005–2007 period in losses of mobile homes through moves; a sharp decline in this series occurred only in the last two periods. It is not clear why loss of unit through mobile home moves should be positively correlated with economic activity. Alternatively, one would expect move-ins to be related to move-outs (the two series are positively correlated, 0.825), but the net effect varies across the periods because the swings in gains through moves far exceeds the swings in losses through moves. The net movement of mobile homes added units to the housing stock in the 2003–2005, 2005–2007, and 2007–2009 periods and reduced total additions in the other three periods.

Conversion and merger activity varied greatly between 2001 and 2013. The strong economic expansion saw both the largest number of additions through conversions and mergers (519,000 in the 2001–2003 period) and the smallest number (43,000 in the 2003–2005 period). The highest number of losses through conversions and mergers also occurred during the expansion (275,000 in the 2005–2007 period). There is no discernible trend in either additions or losses through conversions and mergers.

In the 2001–2003 period, 354,000 units were converted to nonresidential use. Movement into nonresidential use was in the 250,000 to 300,000 level in the next 4 periods and then fell to 202,000 in the 2011–2013 period. The largest gain from units returning from nonresidential use was 395,000 in the 2003–2005 period; the smallest gain was 183,000 in the 2009–2011 period.

⁷ The AHS data correspond roughly in magnitude and changes with the monthly home completions series published by the Census Bureau. Using monthly completions from October of the beginning year through September of the ending year, the 2-year completion totals ranged from 3.7 million in the 2003–2005 period to 1.3 million in the 2009–2011 period. The correlation between the two series was 0.93.

Net gains from movement into and out of nonresidential use occurred during the strong economy from 2003 to 2007 and again in the 2011–2013 period.

We were only able to track the loss of units through disrepair and the gain through repair for the last four periods. Generally more units were lost than recovered. The only exception was the 2009–2011 period, with a net gain of only 15,000 units. The “other” category—both losses and gains—was large throughout. Except for the 2005–2007 period, the net effect was a sizeable loss of units. When we combine gains and losses from repair/disrepair with “other” gains and losses, we find a consistent pattern of net losses, ranging between 25,000 in the 2005–2007 period to 472,000 in the 2007–2009 period.

The fourth row from the bottom measures how the change in weights between AHS surveys affects the count of units that are present in both surveys. This impact ranges from a low of negative 9,000 units in the 2001–2003 period to 1,160,000 in the 2009–2011 period. However, these two extreme estimates are most likely the result of a special influence on how AHS weights are created. For the 2003 AHS, the Census Bureau switched from using numbers based on the 1990 census to number based on the 2000 census to adjust counts. Likewise the Census Bureau switched from the 2000 census to the 2010 census in adjusting weights for the 2011 AHS. Ignoring these two outliers, the change in weights accounted for approximately 5 percent of the absolute value of all the additions and losses between surveys, except for the 2005–2007 period when the change in weights accounted for 11 percent of all the flows.

In all but one period, the change in weights has added a sizeable number of units to the housing stock, suggesting that the procedures used by the Census Bureau to add new units to the sample have systematically missed additions to the stock. The one exception was the atypical period in which the Census Bureau switched from basing counts on the 1990 census to the 2000 census.

The 413,000 increase between the 2011 and 2013 surveys was by far the smallest increase in the housing stock over the 2001–2013 timeframe. During the 2011–2013 period, the number of households (occupied housing units) increased by 987,000 units. The bottom row of Table 4 contains the change in households. Changes in the number of households also followed a cyclical pattern: the number of households grew by 3.0 million in the early expansion years, slowed to 1.8 million toward the end of the expansion, fell to 1.1 million during the recession, and then recovered to 3.1 million between 2009 and 2011.⁸ Once again the 2011–2013 experience is out of line with previous experience.⁹

⁸ The very low household growth between 2001 and 2003 may be due to the re-benchmarking of the AHS in 2003 to the 2000 census.

⁹ Between 2001 and 2013, the housing stock grew 40 percent more than the number of households. The 14.6 million increase in the housing stock consisted of an increase of 10.5 million occupied units (households), 3.2 million vacant units, and 1.0 million seasonal units.

IV. Components That Experienced Atypical Losses or Gains

While the entire housing stock experienced a loss rate of 1.2 percent between 2011 and 2013, the loss rate varied across segments of the stock. For example, the occupied housing stock lost only 0.6 percent of its units between 2011 and 2013. This difference was statistically significant at the 1-percent level.

Appendix B reports losses and additions for 123 overlapping segments of the housing market defined by factors such as structure type, year built, number of rooms, region, quality, tenure, and household and householder characteristics. Using the data in Appendix B, Table 5 compiles a list of housing sectors whose loss rates were markedly higher or lower than the norm.

Where the AHS provides information on all units (55 of 123 segments), Table 5 uses the loss rate of the overall stock (1.2 percent) as a point of comparison. For this group, noteworthy rates are those that are approximately less than half or more than 150 percent of that of the overall stock. For many variables, the AHS can provide information only on occupied units (68 of 123 segments). For this group, noteworthy rates are those that are less than half or more than 150 percent of that of all occupied units (0.6 percent). For both groups, statistical significance at the 5-percent level is required to be included in Table 5.

Some components of the housing stock experienced very high loss rates. Units that were vacant or seasonal in 2011 lost approximately 5 percent of their units by 2013. Very small units, measured either by number of rooms (one or two) or number of bedrooms (none), had loss rates around 8 percent. By the same token, large units had significantly lower loss rates.

Type of structure was also associated with loss rates. Units in structures containing two to four units had above-average loss rates, as did units in structures with four to six stories. The loss rate for mobile homes approached 4 percent. Units in structures with seven or more stories had below-average loss rates. Units located outside metropolitan areas experienced higher-than-average losses. Consistent with these findings, units with septic tanks had higher-than-average loss rates for occupied units.

Among occupied units, quality affected loss rates. Units without complete kitchens, units lacking some or all plumbing facilities, and units with severe or moderate problems of various types had higher-than-average loss rates for occupied units.

Units with households with Black householders experienced higher-than-average loss rates, as did units with households receiving welfare.

Renter-occupied units had higher-than-average loss rates. Income, combined with tenure, has an effect on loss rates. Across both owner and renter households, loss rates decreased as income or housing costs increased. The lowest income renters and rental units with the lowest rents had high loss rates, while the highest income homeowners and those homes with the highest housing costs had low loss rates.

Table 5: Sectors Experiencing Atypical Loss Rates, 2011–2013¹⁰

Characteristics	Total loss	Percent loss
All housing units	1,568,000	1.2%
<i>Occupancy Status</i>		
Occupied	730,000	0.6**
Vacant	616,000	4.6**
Seasonal	222,000	5.4**
<i>Units in Structure</i>		
2 to 4	201,000	1.9**
Manufactured/mobile home or trailer	344,000	3.8**
<i>Year Structure Built</i>		
2005 to 2009	39,000	0.5**
1985 to 1989	49,000	0.5**
1919 or earlier	251,000	2.9**
<i>Rooms</i>		
1	49,000	8.0**
2	113,000	8.4**
3	230,000	2.0**
7	113,000	0.6**
8	36,000	0.3**
9	8,000	0.2**
<i>Bedrooms</i>		
None	109,000	7.9**
1	300,000	2.0**
4 or more	158,000	0.6**
<i>Stories in Structure</i>		
4 to 6	78,000	1.9*
7 or more	11,000	0.5**
<i>Metropolitan/Nonmetropolitan Area</i>		
Outside metropolitan statistical areas	581,000	2.0**
Occupied	730,000	0.6%
<i>Kitchen facilities</i>		
Lacking complete kitchen facilities	32,000	1.6*
<i>Plumbing Facilities</i>		
Lacking some or all plumbing facilities	31,000	2.2**
No bathtub and no shower	21,000	13.3**
<i>Means of Sewage Disposal</i>		
Septic tank or Cesspool	207,000	0.9**

¹⁰ Three conditions were necessary for a housing sector to appear in Table 5, two mathematical and one judgmental: (1) the difference between the sector's loss rate and the overall loss rate had to have been statistically significant at the 5-percent level, (2) the sector's loss rate had to have been approximately less than half or more than 150 percent of the overall loss rate, and (3) the difference had to appear to be interesting.

Characteristics	Total loss	Percent loss
<i>Condition of Unit</i>		
Severe physical problems	36,000	1.7*
Plumbing	31,000	2.2**
Moderate physical problems	71,000	1.8**
Heating	37,000	3.5**
Upkeep	32,000	1.6*
Kitchen	26,000	2.0*
<i>Race/Origin of Householder</i>		
Black	137,000	1.0*
Non-Hispanic	132,000	0.9*
Asian	12,000	0.3**
Two or more races	24,000	1.7*
<i>Income Source of Household</i>		
Welfare	37,000	1.6**
<i>Tenure</i>		
Renter-occupied	380,000	1.0**
<i>Renter Housing Costs</i>		
Less than \$350 per month	34,000	1.0*
\$350 < per month < \$600	110,000	1.9**
\$600 < per month < \$800	80,000	1.0*
No cash rent	34,000	1.7*
<i>Renter Household Income</i>		
Less than \$15,000 per year	133,000	1.2**
\$15,000 < per year < \$30,000	112,000	1.1**
<i>Owner Housing Costs</i>		
Less than \$350 per month	96,000	1.2**
\$1,250 or more per month	74,000	0.2**
<i>Owner Household Income</i>		
\$50,000 < per year < \$100,000	79,000	0.3**
More than \$100,000 per year	60,000	0.3**

* Statistically significant at the 5-percent level. ** Statistically significant at the 1-percent level.

Table 6 compiles a list of housing sectors whose rates of new additions (gains) were markedly higher or lower than the norm. Where the AHS provides information on all units, Table 6 uses the gain rate of the overall stock (1.4 percent) as a point of comparison. For this group, noteworthy rates are those that are less than half or more than 150 percent of that of the overall stock. For many variables, the AHS can provide information only on occupied units. For this group, noteworthy rates are those that are less than half or more than 150 percent of that of all occupied units (1.1 percent). For both groups, statistical significance at the 5-percent level is required to be included in Table 6.

Table 6: Sectors Experiencing Atypical Gain Rates, 2011–2013¹¹

	Total additions	Percent additions
All housing units	1,837,000	1.4%
<i>Occupancy Status</i>		
Vacant	454,000	3.5**
Seasonal	115,000	2.8**
<i>Units in Structure</i>		
1, attached	196,000	2.6**
5 to 9	43,000	0.7**
50 or more	169,000	3.2**
<i>Rooms</i>		
1	47,000	11.1**
2	81,000	6.6**
3	225,000	2.1**
<i>Bedrooms</i>		
None	77,000	7.1**
1	298,000	2.0**
<i>Stories in Structure</i>		
4 to 6	121,000	2.9**
Occupied units	1,269,000	1.1%
<i>Renter Housing Costs</i>		
No cash rent	48,000	2.8**
\$1250 or more per month	142,000	1.6*
<i>Renter Household Income</i>		
More than \$100,000 per year	61,000	2.0*
<i>Owner Housing Costs</i>		
\$600 < per month < \$800	42,000	0.5**
\$1250 or more per month	458,000	1.6**
<i>Owner Household Income</i>		
More than \$100,000 per year	329,000	1.6**

* Statistically significant at the 5-percent level. ** Statistically significant at the 1-percent level

The rate of additions for occupied units (1.1 percent) was lower than the rate of additions for all units, but the difference was not statistically different. Among occupied units, the rate of additions was the same for owner-occupied and renter-occupied units (1.1 percent). There were some statistically significant differences across housing cost and household income categories by tenure. Among units—both owner-occupied and renter-occupied—with housing costs of \$1,250 or more a month and among households—both owner-occupied and renter-occupied—with annual income in excess of \$100,000, the rates of additions were higher than average.

¹¹ Three conditions were necessary for a housing sector to appear in Table 6, two mathematical and one judgmental: (1) the difference between the sector's gain rate and the overall gain rate had to have been statistically significant at the 1-percent level, (2) the sector's gain rate had to have been less than half or more than 150 percent of the overall gain rate, and (3) the difference had to appear to be interesting.

New additions to the stock made up a high proportion (3.5 percent) of the vacant units, possibly because many new units are vacant when they first enter the stock. Single-family attached units and units in large buildings (50 or more units) had significantly higher-than-average gain rates. Units in buildings with four to six floors also had higher-than-average rates of additions.

One- and two-room units and units with no separate bedrooms also had high gain rates.

Components With Both Atypical Gains and Losses

Combining the information from Tables 5 and 6, we are able to see some patterns in how the housing stock evolved between 2011 and 2013.

- Units used for seasonal purposes experienced substantially higher rates of losses (5.4 percent) and additions (2.8 percent) than the overall housing stock, indicating a high rate of turnover among seasonal units.
- Vacant units also had high rates of losses (4.6 percent) and additions (3.5 percent). Vacancy may be a stage before demolition or other type of loss. The high rate of new additions most likely reflects the time needed to market additions to the stock.
- Losses and additions affected the composition of the housing stock by type of structure. Manufactured/mobile homes and units in structures with two to four units had high loss rates, 3.8 and 1.9 percent respectively. Single-family attached units and units in buildings with 50 or more units had high rates of additions, 2.6 and 3.2 percent respectively.
- Small units experienced high turnover. The loss rates were higher than average for one-room (8.0 percent), two-room (8.4 percent), and three-room (2.0 percent) units and units with no bedrooms (7.9 percent) and one bedroom (2.0 percent). The rates of addition were higher than average for one-room (11.1 percent), two-room (6.6 percent), and three-room (2.1 percent) units and units with no bedrooms (7.1 percent) and one bedroom (2.0 percent).
- Low-quality units had higher-than average loss rates. Among occupied units, loss rates were high for those with severe physical problems (1.7 percent) or moderate physical problems (1.8 percent).
- Lower cost units experienced high loss rates. Among renter-occupied units, loss rates were 1.7 percent for those with no cash rent, 1.0 percent for those with gross rents less \$350 per month, 1.9 percent for those with gross rents between \$350 and \$599, and 1.0 percent for those with gross rents between \$600 and \$799. Among owner-occupied units, loss rates were 1.2 percent for those with monthly housing costs less than \$350.
- High-cost units had higher-than average rates of addition. Among both renter-occupied and owner-occupied units, addition rates were 1.6 percent for those with monthly housing costs of \$1,250 or more.

- Loss rates and rates of additions varied by household income in a manner consistent with the pattern by housing costs.
 - Rental units occupied by households with incomes less than \$15,000 or between \$15,000 and \$29,999 had high loss rates, 1.2 and 1.1 percent respectively. Units occupied by high-income owner households with annual incomes between \$50,000 and \$99,999 or of \$100,000 or more had loss rates of 0.3 percent each.
 - Units occupied by households with annual incomes of \$100,000 or more had high rates of addition, 2.0 percent for renter-occupied units and 1.6 percent for owner-occupied units.
 - Units whose occupants reported welfare income in 2011 experienced a loss rate of 1.6 percent.

Appendix A: CINCH Methodology

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 2011 housing stock contained 132,419,000 housing units. Most of these units continued to be part of the 2013 housing stock, but some units disappeared from the housing stock between 2011 and 2013. The AHS estimated that the 2013 housing stock contained 132,832,000 housing units. Simple arithmetic shows that new construction and other additions had to provide a sufficient number of units to overcome any losses between 2011 and 2013 and to increase the overall stock by 413,000 units.

In the context of Figure 1, the U.S. Census Bureau provides estimates for both rectangles (the 2011 and 2013 housing stocks) and one oval (units added through new construction between 2011 and 2013). No one estimates the other three ovals: the number of units that belong to both the 2011 and 2013 housing stock, units lost to the housing stock between 2011 and 2013, and other additions to the housing stock between 2011 and 2013.

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. However, 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:¹²

- 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.

Weighting Issues Involved in Using the AHS

It would be possible to list for every AHS sample unit its status and characteristics in both 2011 and 2013. In some cases, there may be no status (e.g., not yet constructed in 2011) 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 2011 and 2013.

The exact accounting would apply only to AHS sample observations, roughly a 1-in-2,500 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

¹² 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, 2013, as the current year and the previous AHS survey year, 2011, as the base year.

years.¹³ For example, the exact accounting might show that 2,500 sample units that were rental in 2011 became owner-occupied in 2013. To estimate the number of units in the national housing stock that were rental in 2011 and became owner-occupied in 2013, one would need to apply weights. However, using 2011 weights would produce a different estimate than using 2013 weights. There is no conceptual reason to favor the answer using 2011 weights over the answer using 2013 weights. The choice of weights depends upon how the intended analysis will be used.¹⁴

For this reason, previous CINCH analyses have distinguished between:

- (a) *Forward-looking analysis*: starting with the base year stock (2011) and determining the status and characteristics of those units in the current year (2013). The goal is to explain what happened to the 132,419,000 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*: starting from the current year (2013) stock and determining the status and characteristics of *those* units in the base year (2011). The goal is to explain where the 132,832,000 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.

Table 3 and the accompanying discussion showed how it is possible to reconcile the forward-looking and backward-looking analyses at the level of the entire housing stock by taking into account the impact of the change in weights from the 2011 AHS to the 2013 AHS for those units that were in the stock in both years.

In a similar way, one can reconcile the forward-looking and backward-looking analyses for any one segment of the housing market, such as owner-occupied units, with one important difference. At the housing stock, there are three general options: leaving the stock, remaining in the stock, and being added to the stock. At the individual segment level, there are five options: leaving the stock, remaining in the stock in the same segment (owner-occupied), remaining in the stock in a different segment (renter-occupied, vacant, or seasonal), being added to the segment from a different segment, or being added to the segment as a new units in the stock. Because of this

¹³ 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 expanded the AHS sample size in 2011 and combined the national survey with 29 metropolitan-specific surveys, the pure weight of a given unit in 2011 decreased from its 2009 weight because that unit now represents fewer housing units in 2011. 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.

¹⁴ Weighting issues are explained in greater detail in a separate paper, *Weighting Strategy for 2011–2013 CINCH Analysis*.

added level of complexity, we maintain the distinction in Appendix B between forward-looking and backward-looking analysis without attempting a segment-by-segment reconciliation.

Appendix B: CINCH Tables

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 2011 housing stock by 2013. There are three basic dispositions of 2011 units:

- Units that continue to exist in 2013 with the same characteristics (or serving the same market).
- Units that continue to exist in 2013 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 2013 housing stock came from in reference to 2011. There are three basic sources of 2013 units:

- Units that existed in 2011 with the same characteristics (or serving the same market).
- Units that existed in 2011 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 1990 through 1994.
- 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 2011 AHS report counted 114,907,000 occupied units in 2011 (column B, row 2, forward-looking Table A); the 2013 AHS report counted 115,894,000 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 (2011 for the forward-looking tables and 2013 for the backward-looking tables) and (b) satisfying the condition in column A. CINCH uses different weights from 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 C, the weights were created to match certain AHS published totals; for this reason, rows 2 through 4 of Table A are perfect matches; the same is true for rows 5, 6, 7, and 12. This perfect match will not be true for most other rows.¹⁵

- 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 105,864,000 of the occupied units in 2011 were also occupied in 2013.
- 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 8,313,000 units that were occupied in 2011 are still part of the housing stock in 2013 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.

Columns Unique to Forward-Looking Tables

In forward-looking tables, columns F through K track what happened to units that were lost from 2011 to 2013.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2013 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 58,000 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.¹⁶ Among occupied units, 99,000 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

¹⁵ 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.

¹⁶ 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.

business rather than residential purposes.¹⁷ Among occupied units, 68,000 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 2013. In this case, 238,000 units occupied in 2011 were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2013 were condemned or were no longer usable for housing because of extensive damage. Among occupied units, 59,000 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 2013 for other reasons. Among occupied units, there were 207,000 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 K track where units came from that are part of the housing stock in 2013 but were not part of the 2011 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 2013, 48,000 units were additions to the stock since 2011 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, 71,000 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.¹⁸
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 2011. Among occupied units, 91,000 had been nonresidential in 2011.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 2011 and 2013. Among occupied units, 948,000 units were newly constructed.

¹⁷ 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.

¹⁸ The reader will notice that, for the overall housing stock (row 1), the number of houses and mobile homes moved out after 2011 is less than the number moved in by 2013. These totals frequently do not agree because of limitations in the sample design and difficulty in distinguishing new mobile homes from move-ins.

- Column J is the CINCH estimate of the number of units from column C that were added by 2013 from units that were structurally unsound in 2011.¹⁹ Among occupied units, 41,000 had been temporarily lost to the stock in 2011 for structural reasons.
- Column K is the CINCH estimate of the number of units from column C that were added by 2013 from units that had been temporarily lost to the stock for reasons “not classified” or were newly added by “other” means. Among occupied units, 69,000 were recovered from units temporarily lost in 2011 for unspecified reasons or newly added in 2013 for other reasons.

¹⁹ These units had codes that identified them as “occupancy prohibited” or “interior exposed to the elements” in 2011.

Forward-Looking Table A: Housing Characteristics

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
1	Housing Stock	132,419,000	132,420,000	130,852,000	0	98,000	161,000	202,000	470,000	212,000	424,000	1
	Occupancy Status											
2	Occupied	114,907,000	114,907,000	105,864,000	8,313,000	58,000	99,000	68,000	238,000	59,000	207,000	2
3	Vacant	13,379,000	13,381,000	5,123,000	7,642,000	38,000	50,000	85,000	175,000	110,000	158,000	3
4	Seasonal	4,133,000	4,132,000	2,132,000	1,778,000	2,000	11,000	49,000	57,000	43,000	59,000	4
	Units in Structure											
5	1, detached	82,974,000	82,974,000	82,233,000	0	36,000	32,000	70,000	216,000	147,000	239,000	5
6	1, attached	7,768,000	7,768,000	7,710,000	0	2,000	0	11,000	15,000	9,000	23,000	6
7	2 to 4	10,678,000	10,678,000	10,477,000	0	46,000	0	43,000	39,000	22,000	50,000	7
8	5 to 9	6,354,000	6,306,000	6,248,000	0	4,000	0	4,000	15,000	11,000	23,000	8
9	10 to 19	6,028,000	6,076,000	6,030,000	0	1,000	0	14,000	5,000	5,000	19,000	9
10	20 to 49	4,474,000	4,392,000	4,342,000	0	2,000	0	17,000	10,000	9,000	11,000	10
11	50 or more	5,096,000	5,177,000	5,107,000	0	3,000	0	40,000	4,000	8,000	17,000	11
12	Manufactured/mobile home	9,049,000	9,049,000	8,705,000	0	3,000	129,000	4,000	166,000	0	42,000	12

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
	Year Structure Built											
13	2010–2014	720,000	680,000	667,000	0	2,000	0	2,000	4,000	0	6,000	13
14	2005–2011	8,267,000	7,320,000	7,280,000	0	0	10,000	5,000	7,000	0	17,000	14
15	2000–2004	9,250,000	8,823,000	8,755,000	0	3,000	18,000	11,000	25,000	2,000	9,000	15
16	1995–1999	8,948,000	11,057,000	10,934,000	0	0	37,000	14,000	37,000	8,000	26,000	16
17	1990–1994	7,206,000	5,109,000	5,061,000	0	0	17,000	10,000	14,000	0	8,000	17
18	1985–1989	9,014,000	9,027,000	8,979,000	0	4,000	6,000	4,000	15,000	5,000	15,000	18
19	1980–1984	7,715,000	8,284,000	8,207,000	0	3,000	15,000	8,000	27,000	5,000	19,000	19
20	1975–1979	13,579,000	13,952,000	13,795,000	0	6,000	9,000	20,000	59,000	18,000	45,000	20
21	1970–1974	11,176,000	11,202,000	11,082,000	0	4,000	22,000	13,000	38,000	12,000	31,000	21
22	1960–1969	15,405,000	15,735,000	15,563,000	0	7,000	18,000	29,000	45,000	26,000	47,000	22
23	1950–1959	13,455,000	13,851,000	13,719,000	0	17,000	0	18,000	41,000	19,000	37,000	23
24	1940–1949	7,836,000	7,963,000	7,828,000	0	7,000	2,000	22,000	42,000	26,000	37,000	24
25	1930–1939	5,536,000	5,639,000	5,546,000	0	12,000	5,000	7,000	29,000	12,000	27,000	25
26	1920–1929	5,323,000	5,120,000	5,031,000	0	11,000	0	7,000	31,000	14,000	27,000	26
27	1919 or earlier	8,989,000	8,658,000	8,406,000	0	21,000	1,000	31,000	59,000	66,000	73,000	27

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
	Rooms											
28	1 room	601,000	609,000	211,000	349,000	2,000	3,000	28,000	2,000	4,000	10,000	28
29	2 rooms	1,404,000	1,347,000	576,000	659,000	8,000	2,000	16,000	33,000	12,000	42,000	29
30	3 rooms	11,433,000	11,283,000	8,110,000	2,942,000	26,000	6,000	50,000	47,000	25,000	76,000	30
31	4 rooms	23,636,000	23,637,000	16,195,000	7,059,000	22,000	50,000	49,000	128,000	64,000	70,000	31
32	5 rooms	30,440,000	30,356,000	19,407,000	10,586,000	18,000	66,000	22,000	129,000	52,000	76,000	32
33	6 rooms	27,779,000	27,995,000	18,477,000	9,274,000	10,000	25,000	18,000	69,000	41,000	81,000	33
34	7 rooms	17,868,000	18,062,000	11,882,000	6,068,000	4,000	5,000	11,000	41,000	7,000	43,000	34
35	8 rooms	10,749,000	10,822,000	7,258,000	3,528,000	8,000	3,000	3,000	11,000	2,000	10,000	35
36	9 rooms	4,854,000	4,885,000	3,050,000	1,827,000	0	0	1,000	3,000	2,000	3,000	36
37	10 rooms or more	3,654,000	3,424,000	2,602,000	792,000	0	0	4,000	7,000	5,000	13,000	37
	Bedrooms											
38	None	1,413,000	1,392,000	707,000	576,000	6,000	6,000	37,000	10,000	13,000	37,000	38
39	1	14,924,000	14,800,000	12,780,000	1,721,000	35,000	5,000	59,000	81,000	26,000	93,000	39
40	2	35,083,000	35,210,000	30,841,000	3,888,000	29,000	52,000	55,000	166,000	82,000	97,000	40
41	3	54,245,000	54,463,000	49,749,000	4,195,000	14,000	89,000	33,000	168,000	70,000	146,000	41
42	4 or more	26,755,000	26,555,000	24,281,000	2,116,000	14,000	8,000	18,000	45,000	22,000	51,000	42
43	Multiunit structures	NA	32,629,000	32,204,000	0	57,000	0	118,000	73,000	56,000	120,000	43

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
	Stories in Structures											
44	1	NA	3,994,000	3,931,000	0	11,000	0	11,000	17,000	6,000	18,000	44
45	2	NA	13,529,000	13,365,000	0	19,000	0	41,000	45,000	20,000	37,000	45
46	3	NA	8,568,000	8,459,000	0	16,000	0	30,000	10,000	20,000	33,000	46
47	4 to 6	NA	4,106,000	4,028,000	0	11,000	0	32,000	0	10,000	26,000	47
48	7 or more	NA	2,432,000	2,421,000	0	0	0	4,000	0	0	7,000	48
	Region											
49	Northeast	23,717,000	23,978,000	23,718,000	0	38,000	0	28,000	55,000	40,000	99,000	49
50	Midwest	29,545,000	29,209,000	28,849,000	0	14,000	28,000	49,000	117,000	56,000	95,000	50
51	South	50,381,000	50,237,000	49,526,000	0	29,000	120,000	75,000	235,000	94,000	159,000	51
52	West	28,776,000	28,996,000	28,759,000	0	17,000	13,000	50,000	63,000	23,000	71,000	52
	Metro Status											
53	Inside metro area	104,017,000	103,272,000	102,285,000	0	76,000	60,000	124,000	293,000	136,000	298,000	53
54	In central cities	38,599,000	37,400,000	36,974,000	0	49,000	3,000	70,000	124,000	67,000	112,000	54
55	In suburbs	65,418,000	65,872,000	65,311,000	0	26,000	57,000	54,000	169,000	69,000	186,000	55
56	Outside metro area	28,402,000	29,148,000	28,567,000	0	23,000	101,000	78,000	177,000	76,000	125,000	56

Forward-Looking Table B: Unit Quality

Row	A Characteristics	B Published numbers	C Present in 2011	D 2011 units present in 2013	E Change in characteristics	F 2011 units lost due to conversion/merger	G 2011 house or mobile home moved out	H 2011 units changed to nonresidential use	I 2011 units lost through demolition or disaster	J 2011 units badly damaged or condemned	K 2011 units lost in other ways	Row
1	Occupied Units	114,907,000	114,907,000	105,864,000	8,313,000	58,000	99,000	68,000	238,000	59,000	207,000	1
	Kitchen											
2	With complete kitchen	112,898,000	112,940,000	102,698,000	9,544,000	56,000	97,000	59,000	235,000	57,000	194,000	2
3	Lacking complete kitchen facilities	2,010,000	1,967,000	199,000	1,737,000	2,000	2,000	10,000	3,000	2,000	13,000	3
	Plumbing											
4	With all plumbing facilities	113,472,000	113,505,000	103,575,000	9,232,000	58,000	99,000	68,000	208,000	58,000	207,000	4
5	Lacking some or all plumbing facilities	1,435,000	1,402,000	119,000	1,252,000	0	0	0	30,000	1,000	0	5
6	No hot piped water	189,000	180,000	44,000	128,000	0	0	0	7,000	1,000	0	6
7	No bathtub and no shower	147,000	158,000	39,000	98,000	0	0	0	21,000	0	0	7
8	No flush toilet	122,000	121,000	49,000	72,000	0	0	0	0	0	0	8
9	No exclusive use	1,183,000	1,147,000	40,000	1,104,000	0	0	0	2,000	0	0	9
	Water											
10	Public/private water	101,397,000	101,000,000	92,670,000	7,726,000	53,000	62,000	68,000	194,000	59,000	168,000	10
11	Well	13,131,000	13,499,000	12,460,000	941,000	5,000	38,000	0	19,000	0	36,000	11
12	Other water source	380,000	408,000	303,000	78,000	0	0	0	24,000	0	3,000	12
	Sewer											
13	Public sewer	92,636,000	92,926,000	83,799,000	8,604,000	53,000	41,000	57,000	171,000	53,000	148,000	13
14	Septic tank/cesspool	NA	21,932,000	17,680,000	4,045,000	5,000	58,000	11,000	67,000	6,000	59,000	14
15	Other	NA	48,000	14,000	34,000	0	0	0	0	0	0	15

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
16	Severe Problems	2,125,000	2,093,000	228,000	1,829,000	0	0	1,000	31,000	2,000	3,000	16
17	Plumbing	1,435,000	1,402,000	119,000	1,252,000	0	0	0	30,000	1,000	0	17
18	Heating	602,000	617,000	44,000	567,000	0	0	1,000	1,000	2,000	3,000	18
19	Electric	65,000	68,000	53,000	15,000	0	0	0	0	0	0	19
20	Upkeep	79,000	49,000	0	49,000	0	0	0	0	0	0	20
21	Moderate Problems	4,199,000	4,027,000	1,018,000	2,937,000	2,000	4,000	10,000	17,000	5,000	34,000	21
22	Plumbing	215,000	236,000	9,000	223,000	0	0	0	0	0	4,000	22
23	Heating	1,041,000	1,053,000	775,000	242,000	0	0	0	30,000	0	6,000	23
24	Kitchen	1,833,000	1,967,000	199,000	1,737,000	2,000	2,000	10,000	3,000	2,000	13,000	24
25	Upkeep	1,242,000	1,284,000	129,000	1,129,000	0	2,000	0	5,000	3,000	16,000	25

Forward-Looking Table C: Occupant Characteristics

Row	A	B	C	D	E	F	G	H	I	J	K	Row
	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	
1	Occupied Units	114,907,000	114,907,000	105,864,000	8,313,000	58,000	99,000	68,000	238,000	59,000	207,000	1
	Age of Householder											
2	Under 65	89,849,000	87,574,000	76,339,000	10,649,000	52,000	75,000	47,000	204,000	47,000	162,000	2
3	65 to 74	13,168,000	14,138,000	10,472,000	3,604,000	6,000	6,000	2,000	10,000	8,000	30,000	3
4	75 or older	11,890,000	13,195,000	10,619,000	2,494,000	0	18,000	19,000	24,000	4,000	16,000	4
	Children											
5	Some	37,573,000	37,253,000	28,617,000	8,458,000	20,000	19,000	9,000	68,000	15,000	47,000	5
6	None	77,334,000	77,654,000	65,973,000	11,129,000	38,000	81,000	59,000	170,000	44,000	160,000	6
	Race/Origin of Householder											
7	White	92,820,000	93,137,000	83,703,000	8,887,000	43,000	74,000	54,000	178,000	44,000	154,000	7
8	Hispanic	12,630,000	12,849,000	10,471,000	2,289,000	10,000	0	12,000	16,000	16,000	36,000	8
9	Non-Hispanic	80,190,000	80,288,000	71,389,000	8,441,000	33,000	74,000	42,000	162,000	28,000	118,000	9
10	Black	14,694,000	14,416,000	11,516,000	2,763,000	8,000	17,000	4,000	50,000	14,000	44,000	10
11	Hispanic	535,000	500,000	256,000	239,000	0	0	0	1,000	0	4,000	11
12	Non-Hispanic	14,159,000	13,915,000	11,146,000	2,638,000	8,000	17,000	4,000	49,000	13,000	40,000	12
13	American Indian, Eskimo, Aleut	965,000	853,000	571,000	274,000	2,000	2,000	0	3,000	0	0	13
14	Asian	4,620,000	4,752,000	3,801,000	939,000	3,000	0	3,000	3,000	0	4,000	14
15	Pacific Islander	328,000	321,000	197,000	121,000	3,000	0	0	0	0	0	15
16	Two or more races	1,480,000	1,429,000	919,000	486,000	0	6,000	7,000	5,000	2,000	5,000	16
17	Total Hispanics	13,841,000	13,974,000	11,533,000	2,345,000	10,000	0	12,000	18,000	16,000	40,000	17

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
	Income Source											
18	Wages and salaries	81,430,000	79,836,000	64,238,000	15,120,000	46,000	57,000	39,000	156,000	43,000	137,000	18
19	Self-employed	13,263,000	13,420,000	5,231,000	8,120,000	2,000	7,000	9,000	19,000	1,000	30,000	19
20	Social security or pension	NA	32,553,000	24,806,000	7,512,000	12,000	45,000	21,000	75,000	13,000	68,000	20
21	Dividend, interest, or rent	NA	28,349,000	13,660,000	14,558,000	1,000	3,000	12,000	57,000	4,000	54,000	21
22	Welfare	2,393,000	2,360,000	408,000	1,915,000	9,000	0	2,000	13,000	2,000	10,000	22

Forward-Looking Table D: Income and Housing Cost

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
1	Occupied Units	114,907,000	114,907,000	105,864,000	8,313,000	58,000	99,000	68,000	238,000	59,000	207,000	1
	Tenure											
2	Owner occupied	76,091,000	76,092,000	69,324,000	6,418,000	14,000	83,000	14,000	116,000	26,000	97,000	2
3	Homeownership rate	66.2%	66.2%									3
4	Renter occupied	38,816,000	38,815,000	31,181,000	7,253,000	45,000	16,000	54,000	122,000	33,000	110,000	4
	Renter Monthly Housing Costs											
5	No cash rent	2,271,000	1,999,000	593,000	1,371,000	4,000	8,000	4,000	14,000	0	5,000	5
6	Less than \$350	3,094,000	3,272,000	1,722,000	1,516,000	0	0	1,000	14,000	2,000	16,000	6
7	\$350 to \$599	5,702,000	5,731,000	2,498,000	3,124,000	9,000	3,000	8,000	58,000	7,000	26,000	7
8	\$600 to \$799	7,823,000	7,662,000	3,358,000	4,223,000	13,000	2,000	11,000	16,000	19,000	19,000	8
9	\$800 to \$1,249	12,072,000	12,035,000	6,830,000	5,132,000	12,000	1,000	10,000	15,000	3,000	32,000	9
10	\$1,250 or more	7,855,000	8,117,000	5,136,000	2,931,000	7,000	2,000	20,000	6,000	2,000	13,000	10
	Renter Household Income											
11	Less than \$15,000	10,495,000	10,959,000	4,661,000	6,165,000	12,000	8,000	21,000	39,000	7,000	46,000	11
12	\$15,000 to \$29,999	9,563,000	9,901,000	2,897,000	6,892,000	14,000	4,000	8,000	47,000	10,000	30,000	12
13	\$30,000 to \$49,999	8,166,000	7,875,000	2,188,000	5,623,000	7,000	0	8,000	24,000	10,000	15,000	13
14	\$50,000 to \$99,999	8,015,000	7,679,000	2,748,000	4,871,000	10,000	4,000	13,000	12,000	6,000	13,000	14
15	\$100,000 or more	2,577,000	2,401,000	757,000	1,632,000	1,000	0	3,000	0	0	7,000	15

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2011	2011 units present in 2013	Change in characteristics	2011 units lost due to conversion/merger	2011 house or mobile home moved out	2011 units changed to nonresidential use	2011 units lost through demolition or disaster	2011 units badly damaged or condemned	2011 units lost in other ways	Row
	Owner Monthly Housing Costs											
16	Less than \$350	9,284,000	7,813,000	4,028,000	3,690,000	0	47,000	0	25,000	10,000	14,000	16
17	\$350 to \$599	12,820,000	12,713,000	5,654,000	6,991,000	0	17,000	4,000	25,000	0	22,000	17
18	\$600 to \$799	8,237,000	8,303,000	2,578,000	5,674,000	3,000	8,000	2,000	28,000	0	10,000	18
19	\$800 to \$1,249	15,879,000	15,561,000	7,413,000	8,087,000	6,000	8,000	5,000	19,000	8,000	15,000	19
20	\$1,250 or more	29,873,000	31,701,000	22,295,000	9,333,000	5,000	3,000	3,000	19,000	8,000	36,000	20
	Owner Household Income											
21	\$0 to \$14,999	7,437,000	7,700,000	2,653,000	4,974,000	3,000	25,000	2,000	22,000	8,000	13,000	21
22	\$15,000 to \$29,999	11,095,000	11,608,000	4,007,000	7,515,000	3,000	29,000	0	23,000	8,000	22,000	22
23	\$30,000 to \$49,999	13,847,000	14,043,000	4,654,000	9,337,000	0	10,000	0	20,000	5,000	17,000	23
24	\$50,000 to \$99,999	24,518,000	24,178,000	11,929,000	12,170,000	0	19,000	2,000	33,000	5,000	19,000	24
25	\$100,000 or more	19,194,000	18,562,000	11,801,000	6,701,000	8,000	0	9,000	17,000	0	26,000	25

Backward-Looking Table A: Housing Characteristics

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/ merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
1	Housing Stock	132,832,000	132,834,000	130,997,000	0	72,000	94,000	245,000	1,160,000	141,000	125,000	1
	Occupancy Status											
2	Occupied	115,894,000	115,895,000	105,882,000	8,745,000	48,000	71,000	91,000	948,000	41,000	69,000	2
3	Vacant	12,882,000	12,882,000	5,233,000	7,195,000	16,000	12,000	110,000	175,000	90,000	51,000	3
4	Seasonal	4,056,000	4,057,000	1,929,000	2,013,000	8,000	12,000	43,000	37,000	10,000	5,000	4
	Units in Structure											
5	1, detached	84,324,000	84,324,000	83,328,000	0	32,000	5,000	107,000	704,000	84,000	64,000	5
6	1, attached	7,615,000	7,615,000	7,419,000	0	14,000	0	19,000	144,000	11,000	7,000	6
7	2 to 4	10,805,000	10,805,000	10,663,000	0	25,000	0	34,000	40,000	22,000	21,000	7
8	5 to 9	6,664,000	6,505,000	6,462,000	0	1,000	0	9,000	24,000	1,000	8,000	8
9	10 to 19	6,185,000	6,345,000	6,256,000	0	0	0	15,000	56,000	5,000	12,000	9
10	20 to 49	4,610,000	4,618,000	4,550,000	0	0	0	3,000	63,000	0	2,000	10
11	50 or more	5,251,000	5,244,000	5,075,000	0	0	0	46,000	116,000	1,000	6,000	11
12	Manufactured/mobile home	7,378,000	7,378,000	7,244,000	0	0	89,000	12,000	12,000	18,000	4,000	12

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
	Year Structure Built											
13	2010–2014	2,379,000	1,785,000	705,000	0	0	8,000	7,000	1,060,000	0	5,000	13
14	2005–2011	7,845,000	8,208,000	8,133,000	0	0	10,000	7,000	51,000	2,000	5,000	14
15	2000–2004	8,969,000	9,563,000	9,523,000	0	3,000	9,000	20,000	5,000	2,000	0	15
16	1995–1999	8,613,000	11,355,000	11,310,000	0	1,000	9,000	23,000	3,000	1,000	8,000	16
17	1990–1994	6,919,000	4,975,000	4,961,000	0	0	8,000	3,000	0	3,000	0	17
18	1985–1989	8,664,000	9,067,000	9,029,000	0	2,000	8,000	17,000	0	3,000	9,000	18
19	1980–1984	7,563,000	7,935,000	7,888,000	0	4,000	11,000	13,000	8,000	8,000	3,000	19
20	1975–1979	14,018,000	13,850,000	13,779,000	0	8,000	10,000	23,000	3,000	13,000	15,000	20
21	1970–1974	11,147,000	10,886,000	10,839,000	0	8,000	10,000	4,000	3,000	7,000	14,000	21
22	1960–1969	15,400,000	15,041,000	14,966,000	0	8,000	6,000	20,000	4,000	21,000	15,000	22
23	1950–1959	13,595,000	13,016,000	12,972,000	0	15,000	3,000	11,000	2,000	4,000	9,000	23
24	1940–1949	7,952,000	7,683,000	7,608,000	0	11,000	0	24,000	11,000	16,000	14,000	24
25	1930–1939	5,731,000	5,538,000	5,487,000	0	7,000	2,000	27,000	0	10,000	5,000	25
26	1920–1929	5,248,000	5,002,000	4,963,000	0	3,000	0	17,000	5,000	10,000	5,000	26
27	1919 or earlier	8,789,000	8,930,000	8,833,000	0	3,000	0	29,000	6,000	42,000	18,000	27

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
	Rooms											
28	1 room	375,000	421,000	218,000	156,000	3,000	2,000	24,000	10,000	4,000	3,000	28
29	2 rooms	1,333,000	1,236,000	542,000	612,000	8,000	4,000	42,000	12,000	7,000	7,000	29
30	3 rooms	11,104,000	10,794,000	8,099,000	2,470,000	27,000	6,000	58,000	101,000	7,000	26,000	30
31	4 rooms	22,454,000	22,308,000	16,148,000	5,819,000	21,000	40,000	38,000	170,000	42,000	31,000	31
32	5 rooms	28,770,000	28,416,000	19,318,000	8,771,000	10,000	27,000	31,000	214,000	25,000	20,000	32
33	6 rooms	28,325,000	28,090,000	18,428,000	9,336,000	0	9,000	30,000	229,000	37,000	20,000	33
34	7 rooms	18,973,000	19,407,000	12,021,000	7,174,000	2,000	5,000	10,000	168,000	13,000	14,000	34
35	8 rooms	11,751,000	12,245,000	7,259,000	4,858,000	0	0	6,000	119,000	2,000	0	35
36	9 rooms	5,498,000	5,748,000	3,114,000	2,546,000	0	0	4,000	79,000	2,000	3,000	36
37	10 rooms or more	4,249,000	4,170,000	2,705,000	1,403,000	0	0	1,000	59,000	3,000	0	37
	Bedrooms											
38	None	1,105,000	1,082,000	665,000	340,000	3,000	2,000	34,000	18,000	8,000	12,000	38
39	1	15,221,000	14,860,000	12,783,000	1,779,000	36,000	11,000	82,000	125,000	10,000	34,000	39
40	2	34,645,000	34,828,000	30,855,000	3,555,000	25,000	41,000	67,000	206,000	46,000	33,000	40
41	3	54,644,000	54,617,000	49,673,000	4,331,000	8,000	38,000	41,000	431,000	65,000	31,000	41
42	4 or more	27,218,000	27,447,000	24,569,000	2,446,000	0	2,000	21,000	381,000	13,000	15,000	42
43	Multunit structures	NA	33,517,000	33,005,000	0	26,000	0	107,000	299,000	29,000	50,000	42
	Stories in Structures											
44	1	NA	4,145,000	4,099,000	0	3,000	0	16,000	16,000	6,000	4,000	43
45	2	NA	13,888,000	13,734,000	0	17,000	0	37,000	73,000	11,000	16,000	44
46	3	NA	9,022,000	8,875,000	0	3,000	0	14,000	94,000	10,000	25,000	45
47	4 to 6	NA	4,183,000	4,061,000	0	3,000	0	37,000	79,000	1,000	2,000	46
48	7 or more	NA	2,279,000	2,236,000	0	0	0	3,000	37,000	1,000	2,000	47

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/ merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
	Region											
49	Northeast	23,719,000	24,076,000	23,788,000	0	24,000	4,000	42,000	165,000	21,000	32,000	48
50	Midwest	29,606,000	28,937,000	28,588,000	0	13,000	39,000	41,000	193,000	31,000	33,000	49
51	South	50,679,000	50,204,000	49,369,000	0	10,000	42,000	109,000	563,000	78,000	34,000	50
52	West	28,828,000	29,617,000	29,252,000	0	25,000	9,000	53,000	240,000	12,000	25,000	51
	Metro Status											
53	Inside metro area	104,948,000	104,941,000	103,480,000	0	67,000	50,000	173,000	993,000	86,000	93,000	52
54	In central cities	39,980,000	39,436,000	38,853,000	0	30,000	0	72,000	396,000	48,000	37,000	53
55	In suburbs	64,968,000	65,505,000	64,626,000	0	37,000	50,000	101,000	597,000	38,000	56,000	54
56	Outside metro area	27,884,000	27,893,000	27,517,000	0	5,000	44,000	72,000	167,000	55,000	32,000	55

Backward-Looking Table B: Unit Quality

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
1	Occupied Units	115,894,000	115,895,000	105,882,000	8,745,000	48,000	71,000	91,000	948,000	41,000	69,000	1
	Kitchen											
2	With complete kitchen	113,880,000	113,883,000	102,718,000	9,915,000	48,000	71,000	80,000	940,000	41,000	69,000	2
3	Lacking complete kitchen facilities	2,014,000	2,012,000	215,000	1,778,000	0	0	12,000	7,000	0	0	3
	Plumbing											
4	With all plumbing facilities	114,633,000	114,621,000	103,632,000	9,734,000	46,000	68,000	89,000	945,000	38,000	69,000	4
5	Lacking some or all plumbing facilities	1,261,000	1,274,000	134,000	1,127,000	2,000	3,000	2,000	3,000	3,000	0	5
6	No hot piped water	107,000	100,000	48,000	48,000	0	0	0	0	3,000	0	6
7	No bathtub and no shower	103,000	100,000	44,000	56,000	0	0	0	0	0	0	7
8	No flush toilet	94,000	94,000	53,000	41,000	0	0	0	0	0	0	8
9	No exclusive use	1,097,000	1,118,000	45,000	1,062,000	2,000	3,000	2,000	3,000	0	0	9
	Water											
10	Public/private water	102,450,000	101,890,000	92,415,000	8,312,000	42,000	53,000	76,000	902,000	34,000	56,000	10
11	Well	13,093,000	13,635,000	12,732,000	802,000	6,000	17,000	15,000	46,000	7,000	10,000	11
12	Other	351,000	370,000	311,000	55,000	0	0	0	0	0	4,000	12
	Sewer											
13	Public sewer	94,700,000	95,112,000	83,611,000	10,439,000	40,000	35,000	66,000	837,000	31,000	52,000	13
14	Septic tank/cesspool	21,163,000	20,756,000	17,959,000	2,591,000	8,000	36,000	25,000	110,000	11,000	17,000	14
15	Other	31,000	27,000	15,000	11,000	0	0	0	0	0	0	15

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/ merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
16	Severe Problems	1,950,000	1,892,000	244,000	1,627,000	2,000	3,000	4,000	6,000	5,000	0	16
17	Plumbing	1,261,000	1,274,000	134,000	1,127,000	2,000	3,000	2,000	3,000	3,000	0	17
18	Heating	571,000	490,000	43,000	440,000	0	0	2,000	3,000	2,000	0	18
19	Electric	93,000	96,000	59,000	37,000	0	0	0	0	0	0	19
20	Upkeep	68,000	66,000	0	66,000	0	0	0	0	0	0	20
21	Moderate Problems	3,939,000	3,818,000	997,000	2,794,000	2,000	4,000	12,000	7,000	0	2,000	21
22	Plumbing	220,000	241,000	7,000	234,000	0	0	0	0	0	0	22
23	Heating	998,000	956,000	760,000	189,000	2,000	2,000	3,000	0	0	0	23
24	Kitchen	1,869,000	2,012,000	215,000	1,778,000	0	0	12,000	7,000	0	0	24
25	Upkeep	986,000	1,027,000	114,000	909,000	0	2,000	0	0	0	2,000	25

Backward-Looking Table C: Occupant Characteristics

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
1	Occupied Units	115,894,000	115,895,000	105,882,000	8,745,000	48,000	71,000	91,000	948,000	41,000	69,000	1
	Age of Householder											
2	Under 65	89,086,000	87,343,000	76,805,000	9,449,000	46,000	60,000	55,000	829,000	38,000	61,000	2
3	65 to 74	14,549,000	15,156,000	10,292,000	4,744,000	0	6,000	18,000	87,000	3,000	7,000	3
4	75 or older	12,259,000	13,397,000	10,487,000	2,850,000	2,000	6,000	18,000	32,000	0	1,000	4
	Children											
5	Some	37,082,000	37,361,000	28,830,000	8,065,000	6,000	19,000	13,000	398,000	12,000	18,000	5
6	None	78,813,000	78,534,000	65,616,000	12,116,000	42,000	52,000	78,000	550,000	29,000	51,000	6
	Race/Origin of Householder											
7	White	93,298,000	93,591,000	83,768,000	8,803,000	40,000	67,000	74,000	743,000	34,000	63,000	7
8	Hispanic	13,447,000	13,568,000	10,501,000	2,899,000	7,000	12,000	11,000	118,000	14,000	7,000	8
9	Non-Hispanic	79,851,000	80,023,000	71,407,000	7,764,000	33,000	55,000	63,000	625,000	20,000	55,000	9
10	Black	15,023,000	14,877,000	11,646,000	3,090,000	7,000	0	16,000	107,000	5,000	7,000	10
11	Hispanic	590,000	557,000	262,000	288,000	0	0	0	3,000	2,000	2,000	11
12	Non-Hispanic	14,433,000	14,320,000	11,269,000	2,917,000	7,000	0	16,000	104,000	3,000	5,000	12
13	American Indian, Eskimo, Aleut	942,000	876,000	566,000	302,000	0	2,000	0	6,000	0	0	13
14	Asian	4,750,000	4,769,000	3,579,000	1,112,000	0	0	0	78,000	0	0	14
15	Pacific Islander	348,000	326,000	185,000	133,000	1,000	0	0	6,000	0	0	15
16	Two or more races	1,532,000	1,456,000	901,000	541,000	0	2,000	2,000	8,000	3,000	0	16
17	Total Hispanics	14,681,000	14,741,000	11,585,000	2,978,000	7,000	12,000	11,000	124,000	16,000	9,000	17

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
	Income Source											
18	Wages and salaries	81,996,000	81,167,000	64,640,000	15,541,000	35,000	56,000	45,000	759,000	36,000	55,000	18
19	Self-employed	12,472,000	12,493,000	5,318,000	7,066,000	4,000	2,000	6,000	87,000	4,000	6,000	19
20	Social security or pension	NA	33,285,000	24,522,000	8,545,000	2,000	16,000	24,000	161,000	5,000	11,000	20
21	Dividend, interest, or rent	NA	27,609,000	13,722,000	13,596,000	5,000	2,000	12,000	260,000	0	12,000	21
22	Welfare	2,270,000	2,260,000	407,000	1,839,000	3,000	0	3,000	9,000	0	0	22

Backward-Looking Table D: Income and Housing Cost

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
1	Occupied Units	115,894,000	115,895,000	105,882,000	8,745,000	48,000	71,000	91,000	948,000	41,000	69,000	1
	Tenure											
2	Owner occupied	75,676,000	75,676,000	69,142,000	5,726,000	7,000	43,000	11,000	702,000	22,000	23,000	2
3	Homeownership rate	65.3%	65.3%									3
4	Renter occupied	40,218,000	40,219,000	31,444,000	8,314,000	41,000	28,000	80,000	246,000	20,000	47,000	4
	Renter Monthly Housing Costs											
5	No cash rent	2,076,000	1,730,000	601,000	1,081,000	4,000	5,000	20,000	5,000	3,000	12,000	5
6	Less than \$350	3,432,000	3,536,000	1,691,000	1,816,000	0	3,000	10,000	11,000	0	6,000	6
7	\$350 to \$599	6,039,000	6,069,000	2,613,000	3,389,000	3,000	12,000	18,000	27,000	6,000	2,000	7
8	\$600 to \$799	7,639,000	7,626,000	3,506,000	4,060,000	13,000	5,000	10,000	23,000	5,000	3,000	8
9	\$800 to \$1,249	12,621,000	12,552,000	6,925,000	5,513,000	9,000	2,000	14,000	75,000	3,000	12,000	9
10	\$1,250 or more	8,412,000	8,706,000	4,930,000	3,634,000	12,000	2,000	9,000	105,000	2,000	12,000	10
	Renter Household Income											
11	Less than \$15,000	10157000	10,397,000	4,653,000	5,619,000	8,000	10,000	32,000	67,000	0	7,000	11
12	\$15,000 to \$29,999	9,224,000	9,692,000	2,995,000	6,627,000	6,000	15,000	10,000	26,000	7,000	7,000	12
13	\$30,000 to \$49,999	8,719,000	8,495,000	2,217,000	6,169,000	15,000	0	12,000	54,000	11,000	17,000	13
14	\$50,000 to \$99,999	7,377,000	8,632,000	2,736,000	5,800,000	10,000	3,000	18,000	53,000	2,000	11,000	14
15	\$100,000 or more	3,176,000	3,003,000	722,000	2,221,000	3,000	0	8,000	46,000	0	4,000	15

	A	B	C	D	E	F	G	H	I	J	K	
Row	2013 Characteristics	Published	Present in 2013	2013 units present in 2011	Change in characteristics	2013 units added by conversion/merger	2013 house or mobile home moved in	2013 units added from nonresidential use	2013 units added by new construction	2013 units added from temporary losses in 2011 stock	2013 units added in other ways	Row
	Owner Monthly Housing Costs											
16	Less than \$350	11,078,000	9,154,000	3,879,000	5,187,000	6,000	16,000	4,000	49,000	6,000	6,000	16
17	\$350 to \$599	13,495,000	13,344,000	5,735,000	7,520,000	0	18,000	4,000	58,000	3,000	7,000	17
18	\$600 to \$799	8,137,000	8,238,000	2,589,000	5,607,000	0	4,000	0	37,000	2,000	0	18
19	\$800 to \$1,249	16,086,000	16,258,000	7,539,000	8,589,000	0	0	3,000	119,000	6,000	2,000	19
20	\$1,250 or more	26,879,000	28,682,000	22,145,000	6,078,000	1,000	5,000	0	439,000	5,000	8,000	20
	Owner Household Income											
21	\$0 to \$14,999	7,490,000	7,394,000	2,558,000	4,775,000	3,000	7,000	3,000	45,000	2,000	3,000	21
22	\$15,000 to \$29,999	10,644,000	11,002,000	3,935,000	6,994,000	2,000	14,000	6,000	42,000	9,000	0	22
23	\$30,000 to \$49,999	12,927,000	13,190,000	4,699,000	8,384,000	2,000	16,000	0	81,000	5,000	4,000	23
24	\$50,000 to \$99,999	24,198,000	24,124,000	12,085,000	11,801,000	1,000	7,000	0	218,000	4,000	7,000	24
25	\$100,000 or more	20,592,000	19,966,000	11,711,000	7,926,000	0	0	3,000	316,000	2,000	8,000	25

Appendix C: Consistency Checks and Weighting

Internal and External Checks

For the Components of Inventory Change (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 prior to rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13–27) 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 breakout 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 breakout 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 prior to rounding.

Column B provides an external check of how well the CINCH weighting performed. In general, the CINCH estimates are within 5 percent of the American Housing Survey (AHS) published totals, and many of the CINCH estimates are very close to the AHS estimates.

Weighting

CINCH separates the AHS samples in 2011 and 2013 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 2011 housing stock but are not part of the 2013 housing stock (LOSSES), and units that are not part of the 2011 housing stock but are part of the 2013 housing stock (ADDITIONS). ADDITIONS are split into NEW CONSTRUCTION and OTHER ADDITIONS (structures that existed in 2011 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 2011 and those ADDITIONS that were interviewed in 2013.²⁰

For the forward-looking analysis, we started with the AHS pure weights. We used the AHS weighted count in 2011 of LOSSES to create new pure weights for interviewed LOSSES. We used the AHS published count of the stock in 2011 and our estimate of LOSSES to create new

²⁰ The following example may help. Assume we want to know whether a unit that was classified as having severe physical problems in 2011 continued to be so classified in 2013. We can only know whether a unit had severe physical problems in 2011 if there is information on physical adequacy (the ZADEQ variable) in 2011 (i.e., the unit was interviewed). To complete line 16 in Forward-Looking Table B, information from the 2013 survey is needed (either information on type of loss for columns F through K or information from an interview for columns D and E).

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 2011. These matches were performed separately for single-family detached, single-family attached, 2–4 unit structures, 5–19 unit structures, 20+ unit structures, and mobile homes.

For the backward-looking analysis, we started with the AHS pure weights. We used the AHS weighted counts in 2013 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 2013 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 2013. These matches were performed separately for single-family detached, single-family attached, 2–4 unit structures, 5–19 unit structures, 20+ unit structures, and mobile homes.

The logic behind the weighting and the procedures used to create the weights is explained in *Weighting Strategy for 2011–2013 CINCH Analysis*.