

# **American Housing Survey**

## **Components of Inventory Change: 2009–2011**

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# Components of Inventory Change: 2009–2011

## Executive Summary

Components of Inventory Change (CINCH) is a tool used by housing analysts to study how the housing inventory changes over time. One typically thinks of the housing stock evolving through two mechanisms—the construction of new units and 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.

Between 2009 and 2011, 1,699,000 units left the housing stock (Table 1). Of these, 861,000 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Demolitions and natural disasters accounted for 519,000 of the permanent losses, while the movement of mobile homes contributed another 242,000 permanent losses. There were 466,000 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 371,000 units that left the housing either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations.

The number of permanent losses (861,000) between 2009 and 2011 was substantially lower than the numbers recorded before and during the financial crisis and recession: 1,315,000 between 2003 and 2005 and 1,095,000 between 2007 and 2009. (See Table 3.)

Some components of the housing stock experience very high loss rates. Units that were vacant or seasonal in 2009 lost approximately 5 percent of their units by 2011. The loss rate for mobile homes also approached 5 percent; exactly half of these losses came from the mobile home move-outs. Unit size has a very clear relationship to losses. Small units, whether measured in terms of number of rooms or number of bedrooms, have loss rates that are several times that of the overall stock. Among occupied units, quality affects loss rates. Units without complete kitchens and units with moderate problems of various types have higher-than-average (for occupied units) loss rates. Units with severe problems also have abnormally high loss rates, but these rates just failed to be significant at the 1-percent level. Finally, income, combined with tenure, has a small effect on loss rates. 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 the lowest loss rates. (See Table 5.)

Between 2009 and 2011, 2,846,000 units were added to the housing stock (Table 2). Of these, 2,303,000 were new or reconstructed units. New construction added 2,057,000 units, while the movement of mobile homes accounted for another 173,000. Units created through splits and mergers accounted for the remaining 73,000 new or reconstructed units. In the same period, 409,000 units that had at one time been residential units returned to the stock—183,000 from nonresidential use and 226,000 that were not inhabitable in 2009. Finally, 134,000 units entered the stock by other (unspecified) means.

The number of additions between 2009 and 2011 was substantially lower than the numbers recorded before and during the financial crisis and recession, 5,053,000 between 2003 and 2005

and 3,795,000 between 2007 and 2009. (See Table 4.) The fall-off in new construction was even sharper, 2,057,000 between 2009 and 2011 compared to 3,601,000 between 2003 and 2005 and 2,547,000 between 2007 and 2009. The post-recession period has seen very modest creation of new housing.

While the overall housing stock had a modest (2.1 percent) rate of gain through new additions, certain segments grew significantly faster. The faster growing sectors included single-family attached units, units in large buildings (buildings with 50+ units or with 4 to 6 stories), and small units (two-room units and zero-bedroom units). See Table 6.

# Components of Inventory Change: 2009–2011

## 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 2009 and 2011.

While this paper repeats the analysis contained in previous CINCH studies, its organization differs from that of previous reports.<sup>1</sup>

- Section II explains the changes in the housing stock between 2009 and 2011 in terms of losses to the housing stock through demolitions or the 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 2009 and 2011 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 than the overall patterns of losses or additions.

The paper concludes with a series of appendices 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.

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<sup>1</sup> For previous CINCH studies, see <http://www.huduser.org/portal/datasets/cinch.html>.

Econometrica, Inc., completed this report in two stages. CINCH reports normally present both forward-looking analysis (what happened to the 2009 units by 2011) and backward-looking analysis (where did the 2011 units come from in terms of 2009). The initial 2011 public use file (PUF) available for analysis contained incomplete and inaccurate information on other additions, making it impossible to perform the backward-looking analysis.<sup>2</sup> The forward-looking analysis was presented to HUD in December 2013; the backward-looking analysis was added in 2015.

## II. Overall Changes in the Housing Stock: 2009–2011

One typically thinks of the housing stock evolving through two mechanisms—the construction of new units and 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 2009 Housing Units in 2011<sup>3</sup>**

Present in 2009	130,112,000
2009 units present in 2011	128,413,000
<b>Units no longer in the stock</b>	<b>1,699,000</b>
2009 units lost due to conversion/merger	100,000
2009 house or mobile home moved out	242,000
2009 units lost through demolition or disaster	519,000
<b>Permanent losses</b>	<b>861,000</b>
2009 units changed to nonresidential use	255,000
2009 units badly damaged or condemned	211,000
<b>Temporary losses</b>	<b>466,000</b>
<b>2009 units lost in other ways</b>	<b>371,000</b>

Between 2009 and 2011, 1,699,000 units left the housing stock (Table 1). Of these, 861,000 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 466,000 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 371,000 units that left the housing 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 less than a third of all losses. Another important source of permanent losses was the movement from one location to another of mobile homes or occasionally houses. The movement of a mobile home or house is considered a permanent loss because a housing unit is the combination of land and capital. While movement preserves the capital, it dissolves the union

<sup>2</sup> HUD released a new version of the 2011 PUF on November 19, 2013, 7 weeks after the allowed period of performance for the contracted work.

<sup>3</sup> Numbers may not add consistently due to rounding.

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.

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 may be repaired, left in an unusable state, or demolished. Conversions involve the splitting of one unit into two or more units, while mergers involve the combining of two or more units into one unit.

Table 2 describes how the 2011 housing stock evolved from 2009. In the period between the 2009 and the 2011 AHS surveys, 2,846,000 units were added to the housing stock. Eighty-one percent of these additions were either new constructed units (2,057,000—72 percent) or other additions that involved relocation or reconfiguration of residential units. Approximately 173,000 mobile homes were moved to new locations, creating a new union of capital and land. Changes in how Census Bureau field staff reported the movement of mobile homes into new sites may have resulted in an underestimate of these movements.<sup>4</sup> Another 73,000 of the new or reconstructed units resulted from the merger of two or more units or the split of a unit into two or more units.

**Table 2: Sources for the 2011 Housing Stock**

2011 housing stock	132,419,000
2011 units present in 2009	129,573,000
<b>Total additions to stock</b>	<b>2,846,000</b>
Units added by new construction	2,057,000
House or mobile home moved in	173,000
Units added by conversion/merger	73,000
<b>New or reconstructed units</b>	<b>2,303,000</b>
Units added from nonresidential use	183,000
Units added from temporary losses	226,000
<b>Recovered units</b>	<b>409,000</b>
<b>Units added in other ways</b>	<b>134,000</b>

We classified 409,000 units as recovered because these units had been in the housing stock at some point but were classified in 2009 as either nonresidential or temporary losses. Of these, 183,000 were used for either commercial purposes or for institutional housing in 2009, and 226,000 units were listed in 2009 as temporary losses because occupancy had been prohibited or the unit was open to the elements. Finally, 134,000 units were added in other unclassified ways.

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<sup>4</sup> In the 2011 AHS, the Census Bureau classified only 59 units as REUAD = 4 (mobile home move-in) and no units as REUAD = 5, house moved in. In the 2009 AHS, 149 sample units were REUAD = 4 or 5. The 173,000 count in Table 2 is a weighted combination of units where REUAD = 4 and units on land that was classified as a vacant mobile pad in 2009.

### III. Comparison With Recent CINCH Analyses

The economy in general and the housing market in particular have experienced turbulence over the last several years. Analysts talk about the financial crisis of 2007–2009. Troubles with subprime and nontraditional mortgage products began as early as 2006 and grew in volume and spread to other financial markets. The first of several crescendos broke on July 31, 2007, when two of Bear Stearns’ hedge funds filed for bankruptcy. A severe recession followed shortly afterward. The official dating of the business cycle by the National Bureau of Economic Research places the peak of the previous expansion at December 2007 and the trough of the recession at June 2009.

Table 3 presents information on losses to the stock from this CINCH report and the previous three CINCH reports to see if the financial crisis or recession had any effect on the pattern of losses between surveys. Table 3 uses the same permanent, temporary, and other classification of losses as Table 1. These distinctions help identify the effects of the conditions in the economy and the housing market.

**Table 3: Comparison of Losses Between Surveys, 2003–2011**

Losses between surveys	Base year count (in thousands)				Percent of base year stock			
	2003	2005	2007	2009	2003	2005	2007	2009
Present in base year	120,777	124,376	128,203	130,108	100%	100%	100%	100%
<b>Losses between surveys</b>	<b>1,884</b>	<b>2,282</b>	<b>2,084</b>	<b>1,698</b>	<b>1.6%</b>	<b>1.8%</b>	<b>1.6%</b>	<b>1.3%</b>
Units lost due to conversion/merger	146	275	193	100	0.1%	0.2%	0.2%	0.1%
House or mobile home moved out	245	405	411	242	0.2%	0.3%	0.3%	0.2%
Units lost through demolition or disaster	399	635	491	519	0.3%	0.5%	0.4%	0.4%
<b>Permanent losses</b>	<b>790</b>	<b>1,315</b>	<b>1,095</b>	<b>861</b>	<b>0.7%</b>	<b>1.1%</b>	<b>0.9%</b>	<b>0.7%</b>
Units changed to nonresidential use	278	262	288	255	0.2%	0.2%	0.2%	0.2%
Units badly damaged or condemned	274	318	302	211	0.2%	0.3%	0.2%	0.2%
<b>Temporary losses</b>	<b>552</b>	<b>580</b>	<b>590</b>	<b>466</b>	<b>0.5%</b>	<b>0.5%</b>	<b>0.5%</b>	<b>0.4%</b>
Units lost in other ways	543	387	400	371	0.4%	0.3%	0.3%	0.3%

Permanent losses increased during the financial crisis (2005–2009) and did not fall back to a more normal level until the 2009 to 2011 period. Temporary losses and other losses were fairly level over the period, although both increased somewhat from the first period (2003–2005) and then fell somewhat in the last period (2009–2011). Total losses, both in the number of units and as a percentage of the housing stock, were at their lowest levels in the 2009–2011 period.

Table 4 presents information on additions to the stock from this CINCH report and the previous three CINCH reports. Total additions fell off sharply during the 2008–2009 recession and have remained at low levels during the recovery.



**Table 4: Comparison of Additions Between Surveys, 2003–2011**

Additions between surveys	End year count (in thousands)				Percent of end year stock			
	2005	2007	2009	2011	2005	2007	2009	2011
End year units	124,376	128,203	130,112	132,419	100.0%	100.0%	100.0%	100.0%
<b>Total additions to stock</b>	<b>5,053</b>	<b>5,195</b>	<b>3,795</b>	<b>2,846</b>	<b>4.1%</b>	<b>4.1%</b>	<b>2.9%</b>	<b>2.1%</b>
New construction	3,601	3,250	2,547	2,057	2.9%	2.5%	2.0%	1.6%
House or mobile home moved in	442	840	470	174	0.4%	0.7%	0.4%	0.1%
Units added by conversion/merger	43	146	287	73	0.0%	0.1%	0.2%	0.1%
<b>New or reconstructed units</b>	<b>4,086</b>	<b>4,236</b>	<b>3,304</b>	<b>2,303</b>	<b>3.3%</b>	<b>3.3%</b>	<b>2.5%</b>	<b>1.7%</b>
Units added from nonresidential use	395	279	261	183	0.3%	0.2%	0.2%	0.1%
Units added from temporary losses		150	168	226		0.1%	0.1%	0.2%
<b>Recovered units</b>		<b>429</b>	<b>429</b>	<b>409</b>		<b>0.3%</b>	<b>0.3%</b>	<b>0.3%</b>
<b>Units added in other ways</b>	572	<b>530</b>	<b>62</b>	<b>134</b>	0.5%	<b>0.4%</b>	<b>0.0%</b>	<b>0.1%</b>

New construction composed 71 percent of all additions to the 2005 stock; this share fell to 63 percent in 2007 when the financial crisis hit. The new construction share was 67 percent in 2009 and 72 percent in 2011, the end year with the smallest number of total additions. Conversions and mergers peaked between 2005 and 2009, that is, during the financial crisis and the recession.

The aforementioned concerns about the reporting of mobile home move-ins in the 2011 AHS make it difficult to interpret the impact of economy on this means for expanding the stock. Limitations in the 2005 data prevent separating the recovery of temporary losses from other additions to the stock. The decline in “other” additions after 2007 most likely reflects improvement by the Census Bureau in classifying additions.

#### **IV. Components That Experienced Atypical Losses or Gains**

While the entire housing stock experienced a loss rate of 1.3 percent between 2009 and 2011, the loss rate varied across sectors of the stock. For example, the occupied housing stock lost only 0.7 percent of its units between 2009 and 2011. This difference was statistically significant at the 1-percent level. 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, Table 5 uses the loss rate of the overall stock (1.3 percent) as a point of comparison. For this group, noteworthy rates are those that are less than half or more than double that of the overall stock. For many variables, the AHS can only provide information on occupied units. For this group, noteworthy rates are those that are less than half or more than double that of all occupied units (0.7 percent). For both groups, statistical significance at the 1-percent level is required to be included in Table 5.

Some components of the housing stock experience very high loss rates. Units that were vacant or seasonal in 2009 lost approximately 5 percent of their units by 2011. The loss rate for mobile homes also approached 5 percent; exactly half of these losses came from the mobile home move-outs.

Unit size has a very clear relationship to losses. Small units, whether measured in terms of number of rooms or number of bedrooms, have loss rates that are several times that of the overall stock. By the same token, large units have significantly lower loss rates. Among units in multistoried structures, only those in structures with seven or more stories had loss rates notably different than the overall loss rate (in this case, lower than the overall rate).

Among occupied units, quality affects loss rates. Units without complete kitchens and units with moderate problems of various types have higher-than-average (for occupied units) loss rates. Units with severe problems also have abnormally high loss rates, but these rates just failed to be significant at the 1-percent level.

**Table 5: Sectors Experiencing Atypical Loss Rates, 2009–2011<sup>5</sup>**

<b>Characteristics</b>	<b>Present in 2009</b>	<b>Total loss</b>	<b>Percent lost</b>
<b>Total Housing Stock</b>	<b>130,112,000</b>	<b>1,698,000</b>	<b>1.3%</b>
<i>Occupancy status</i>			
Vacant	13,688,000	615,000	4.5%
Seasonal	4,618,000	254,000	5.5%
<i>Structure type</i>			
Mobile home/trailer	8,769,000	414,000	4.7%
<i>Rooms</i>			
1 room	669,000	83,000	12.4%
2 rooms	1,410,000	67,000	4.8%
8 rooms	10,658,000	50,000	0.5%
9 rooms	4,673,000	19,000	0.4%
10 rooms or more	3,289,000	18,000	0.5%
<i>Bedrooms</i>			
None	1,313,000	119,000	9.1%
4 or more	25,835,000	163,000	0.6%
<i>Stories in structure</i>			
7 or more	2,610,000	14,000	0.5%
<b>Occupied Units</b>	<b>111,806,000</b>	<b>830,000</b>	<b>0.7%</b>
<i>Physical problems</i>			
Lacking complete kitchen facilities	1,739,000	52,000	3.0%
<i>Moderate problems</i>			
Heating	1,125,000	38,000	3.4%
Kitchen	1,739,000	52,000	3.0%
Upkeep	1,247,000	44,000	3.5%
<i>Income source</i>			
Dividend, interest, or rent	30,760,000	89,000	0.3%
<i>Renter monthly housing costs</i>			
Less than \$350	3,110,000	72,000	2.3%
<i>Renter household income</i>			
Less than \$15,000	9,266,000	158,000	1.7%
<i>Owner monthly housing costs</i>			
\$1,250 or more	30,946,000	109,000	0.4%
<i>Owner household income</i>			
\$100,000 or more	18,952,000	55,000	0.3%

<sup>5</sup> 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 1-percent level, (2) the sector's loss rate had to have been less than half or more than double the overall loss rate, and (3) the difference had to appear to be interesting.

Income, combined with tenure, has a small effect on loss rates. 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 the low loss rates. Across both owner and renter households, loss rates increased as income or housing costs decreased. Many of the observed differences were statistically different than those for all owners or all renters, but the differences were relatively minor compared to those at the end of the distributions. Households who have income from dividends, interest, or rent also had lower-than-normal loss rates.

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 (2.1 percent) as a point of comparison. For this group, noteworthy rates are those that are less than half or more than double that of the overall stock. For many variables, the AHS can only provide information on occupied units. For this group, noteworthy rates are those that are less than half or more than double that of all occupied units (1.9 percent). For both groups, statistical significance at the 1-percent level is required to be included in Table 6. Only 10 sectors had gain rates that satisfied these conditions.<sup>6</sup>

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<sup>6</sup> There were 32 sectors that had gain rates that were statistically different from the reference rate at the 1-percent level, but in 22 cases the differences, while significant, were less than half or less than double the reference rate.

**Table 6: Sectors Experiencing Atypical Gain Rates, 2009–2011<sup>7</sup>**

	Estimated 2011 count	Estimated total additions	Percent gain
<b>Total Housing Stock</b>	<b>132,419,000</b>	<b>2,846,000</b>	<b>2.1%</b>
<i>Occupancy status</i>			
Vacant	13,379,000	558,000	4.2%
<i>Units in structure</i>			
1, attached	6,774,000	311,000	4.6%
50 or more	5,576,000	265,000	4.8%
<i>Rooms</i>			
2	1,342,000	84,000	6.3%
<i>Bedrooms</i>			
None	1,412,000	83,000	5.9%
<i>Stories in structure</i>			
4 to 6	4,244,000	195,000	4.6%
<i>Plumbing facilities</i>			
No exclusive use	1,175,000	8,000	0.7%
<i>Moderate physical problems</i>			
Kitchen	1,243,000	9,000	0.7%
<i>Age of householder</i>			
75 years old and over	13,070,000	89,000	0.7%
<i>Race and Hispanic origin</i>			
Two or more races	1,463,000	11,000	0.8%

A high proportion (4.2 percent) of the vacant units were new additions to the stock, possibly because many new units are vacant when they first enter the stock. Single-family attached units and units in large (50+) buildings had significantly higher-than-average gain rates.

Two-room units and units with no separate bedrooms also had high gain rates. These findings, combined with the high loss rates in Table 5 for small units, suggest high turnover among small units.

As one might expect, few units are added to the stock that have shared plumbing facilities or incomplete kitchens. Households with householders 75 years old or older or with householder of more than one race are less likely to live in newly created units.

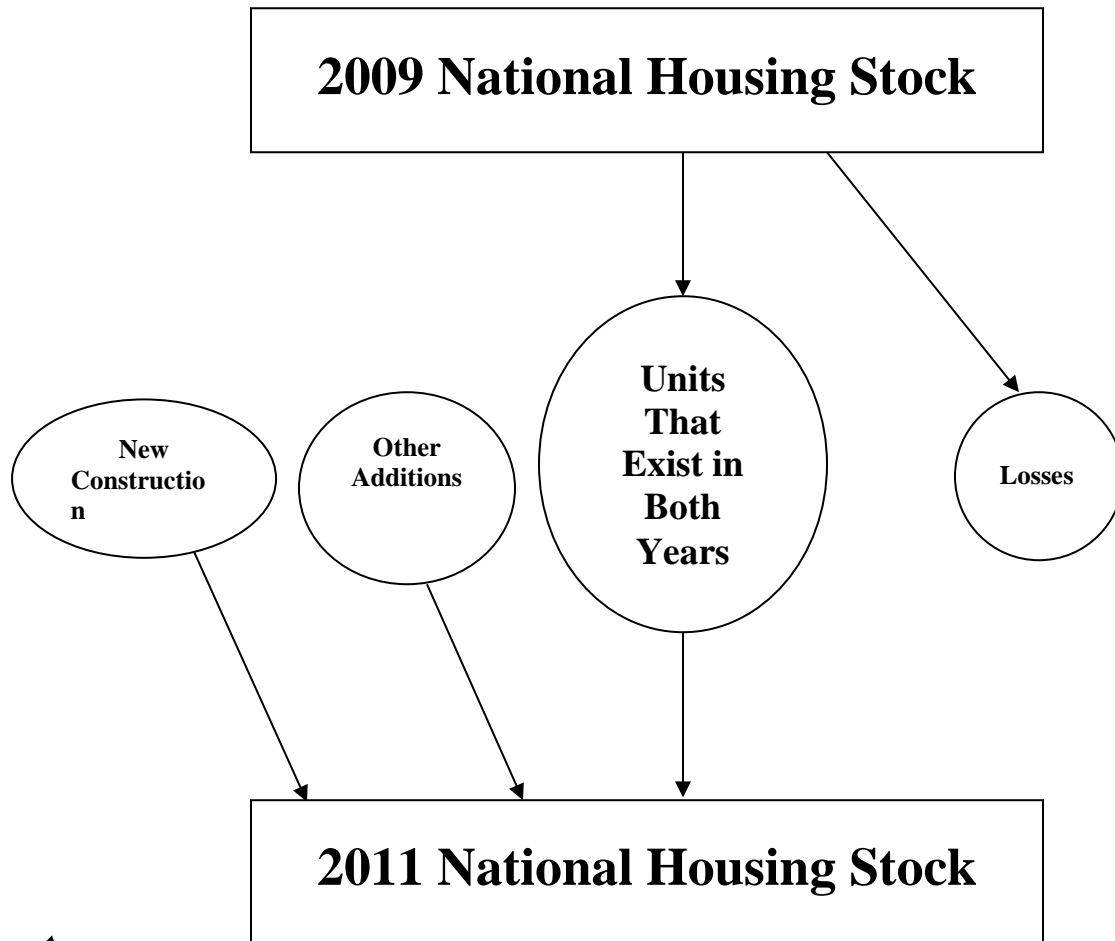
<sup>7</sup> Three conditions were necessary for a housing sector to appear in Table 6, two mathematical and one judgmental: (1) the difference between the sector's gain rate and the overall gain rate had to have been statistically significant at the 1-percent level, (2) the sector's gain rate had to have been less than half or more than double the overall gain rate, and (3) the difference had to appear to be interesting.

## 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 2009 housing stock contained 130,112,000 housing units. Most of these units continued to be part of the 2011 housing stock, but some units disappeared from the housing stock between 2009 and 2011. The AHS estimated that the 2011 housing stock contained 132,419,000 housing units. Simple arithmetic shows that new construction and other additions had to provide a sufficient number of units to overcome any losses between 2009 and 2011 and to increase the overall stock by 2,307,000 units.

In the context of Figure 1, the U.S. Census Bureau provides estimates for both rectangles (the 2009 and 2011 housing stocks) and one oval (units added through new construction between 2009 and 2011). No one estimates the other three ovals: the number of units that belong to both

the 2009 and 2011 housing stock, units lost to the housing stock between 2009 and 2011, and other additions to the housing stock between 2009 and 2011.

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

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

CINCH analysis has three goals:<sup>8</sup>

- 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.

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<sup>8</sup> 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, 2011, as the current year and the previous AHS survey year, 2009, as the base year.

## ***Weighting Issues Involved in Using the AHS***

It would be possible to list for every AHS sample unit its status and characteristics in both 2009 and 2011. In some cases, there may be no status, e.g., not yet constructed in 2009, 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 2009 and 2011.

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 years.<sup>9</sup> For example, the exact accounting might show that 2,500 sample units that were rental in 2009 became owner-occupied in 2011. To estimate the number of units in the national housing stock that were rental in 2009 and became owner-occupied in 2011, one would need to apply weights. But using 2009 weights would produce a different estimate than using 2011 weights. There is no conceptual reason to favor the answer using 2009 weights over the answer using 2011 weights. The choice of weights depends upon how the intended analysis will be used.<sup>10</sup>

For this reason, previous CINCH analyses have distinguished between:

(a) *Forward-looking analysis*, that is, starting with the base year stock (2009) and determining the status and characteristics of *those* units in the current year (2011). The goal is to explain what happened to the 130,112,000 units comprising the housing stock in the base year. Forward-looking analysis takes the housing stock as given in the base year and looks at the destination of these units in the current year.

(b) *Backward-looking analysis*, that is, starting from the current year (2011) stock and determining the status and characteristics of *those* units in the base year (2009). The goal here is to explain where the 132,419,000 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.

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<sup>9</sup> 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.

<sup>10</sup> Weighting issues are explained in greater detail in a separate paper, *Weighting Strategy for 2007–2009 CINCH Analysis*.



## 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 2009 housing stock by 2011. There are three basic dispositions of 2009 units:

- Units that continue to exist in 2011 with the same characteristics (or serving the same market).
- Units that continue to exist in 2011 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 2011 housing stock came from in reference to 2009. There are three basic sources of 2011 units:

- Units that existed in 2009 with the same characteristics (or serving the same market).
- Units that existed in 2009 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 2009 AHS report counted 111,806,000 occupied units in 2009 (column B, row 2, forward-looking Table A); the 2011 AHS report counted 114,907,000 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 (2009 for the forward-looking

tables and 2011 for the backward-looking tables), and (b) satisfying the condition in column A. CINCH uses different weights than those used in preparing the published reports. Therefore, CINCH estimates can differ from AHS estimates for particular subsets of the housing stock. As explained in Appendix C, the weights were created to match certain AHS published totals; for this reason, rows 2 through 4 of Table A are perfect matches. This perfect match will not be true for most other rows.<sup>11</sup>

- Column D is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, and (b) continue to belong to the subset defined by column A. For example, column D of row 2 of forward-looking Table A estimates that 102,030,000 of the occupied units in 2009 were also occupied in 2011.
- 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 8,946,000 units that were occupied in 2009 are still part of the housing stock in 2011 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 2009 to 2011.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2011 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 49,000 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.<sup>12</sup> Among occupied units, 151,000 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

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<sup>11</sup> 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.

<sup>12</sup> 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.<sup>13</sup> Among occupied units, 111,000 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 2011. In this case, 263,000 units occupied in 2009 were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2011 were condemned or were no longer usable for housing because of extensive damage. Among occupied units, 82,000 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 2011 for other reasons. Among occupied units, there were 212,000 units lost for these miscellaneous reasons.

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

#### *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 2011 but were not part of the 2009 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 2011, 64,000 units were additions to the stock since 2009 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, 115,000 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.<sup>14</sup>
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 2009. Among occupied units, 80,000 had been nonresidential in 2009.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 2009 and 2011. Among occupied units, 1,720,000 units were newly constructed.

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<sup>13</sup> If the owner or tenant both lives in a unit and conducts business out of the unit, the AHS considers the unit to be residential. Nonresidential, therefore, means strictly no residential use.

<sup>14</sup> The reader will notice that, for the overall housing stock (row 1), the number of houses and mobile homes moved out after 2009 is less than the number moved in by 2011. 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 2011 from units that were structurally unsound in 2009.<sup>15</sup> Among occupied units, 75,000 had been temporarily lost to the stock in 2009 for structural reasons.
- Column K is the CINCH estimate of the number of units from column C that were added by 2011 from units that had been temporarily lost to the stock for reasons “not classified” or were newly added by “other” means. Among occupied units, 73,000 were recovered from units temporarily lost in 2009 for unspecified reasons or newly added in 2011 for other reasons.

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<sup>15</sup> These units had codes that identified them as “occupancy prohibited” or “interior exposed to the elements” in 2007.

**Forward-Looking Table A: Housing Characteristics**

Row	A	B	C	D	E	F	G	H	I	J	K	Row
	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	
1	Total Housing Stock	130,112,000	130,112,000	128,413,000	0	100,000	242,000	255,000	519,000	211,000	371,000	1
	Occupancy Status											
2	Occupied	111,806,000	111,806,000	102,030,000	8,946,000	49,000	151,000	111,000	263,000	82,000	174,000	2
3	Vacant	13,688,000	13,688,000	5,072,000	8,001,000	43,000	74,000	92,000	181,000	105,000	120,000	3
4	Seasonal	4,618,000	4,618,000	2,287,000	2,078,000	9,000	17,000	52,000	75,000	24,000	77,000	4
	Units in Structure											
5	1, detached	82,472,000	81,739,000	81,015,000	0	35,000	33,000	103,000	229,000	131,000	194,000	5
6	1, attached	7,053,000	6,990,000	6,907,000	0	11,000	0	14,000	11,000	12,000	35,000	6
7	2 to 4	10,160,000	10,308,000	10,109,000	0	31,000	0	37,000	35,000	37,000	58,000	7
8	5 to 9	6,347,000	6,332,000	6,251,000	0	7,000	0	10,000	30,000	15,000	19,000	8
9	10 to 19	5,722,000	5,909,000	5,831,000	0	2,000	0	10,000	30,000	10,000	26,000	9
10	20 to 49	4,525,000	4,643,000	4,612,000	0	3,000	3,000	9,000	3,000	2,000	11,000	10
11	50 or more	5,063,000	5,402,000	5,315,000	0	4,000	0	60,000	6,000	5,000	13,000	11
12	Mobile home/trailer	8,769,000	8,769,000	8,355,000	0	6,000	207,000	11,000	174,000	0	16,000	12

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
	Year Built											
14	2005–2009	7,324,000	6,522,000	6,455,000	0	0	2,000	17,000	10,000	5,000	32,000	14
15	2000–2004	9,158,000	10,513,000	10,409,000	0	7,000	36,000	12,000	27,000	5,000	16,000	15
16	1995–1999	8,821,000	11,362,000	11,276,000	0	3,000	36,000	21,000	13,000	2,000	11,000	16
17	1990–1994	7,060,000	4,825,000	4,777,000	0	2,000	19,000	4,000	17,000	0	5,000	17
18	1985–1989	8,804,000	8,895,000	8,813,000	0	5,000	31,000	5,000	19,000	4,000	18,000	18
19	1980–1984	7,478,000	7,723,000	7,591,000	0	5,000	26,000	10,000	43,000	2,000	46,000	19
20	1975–1979	13,731,000	13,696,000	13,525,000	0	17,000	25,000	19,000	72,000	17,000	21,000	20
21	1970–1974	11,068,000	10,952,000	10,818,000	0	1,000	28,000	6,000	57,000	12,000	30,000	21
22	1960–1969	15,261,000	15,028,000	14,865,000	0	12,000	19,000	15,000	72,000	20,000	25,000	22
23	1950–1959	13,222,000	12,730,000	12,578,000	0	12,000	11,000	29,000	38,000	24,000	40,000	23
24	1940–1949	7,945,000	7,835,000	7,725,000	0	5,000	2,000	18,000	47,000	15,000	23,000	24
25	1930–1939	5,840,000	5,726,000	5,580,000	0	16,000	3,000	22,000	47,000	29,000	29,000	25
26	1920–1929	5,164,000	5,139,000	5,064,000	0	2,000	3,000	19,000	12,000	12,000	27,000	26
27	1919 or earlier	9,235,000	9,166,000	8,938,000	0	15,000	0	59,000	44,000	64,000	46,000	27
	Rooms											
28	1 room	579,000	669,000	281,000	305,000	0	0	53,000	2,000	0	28,000	28
29	2 rooms	1,423,000	1,410,000	510,000	834,000	19,000	0	10,000	10,000	9,000	19,000	29
30	3 rooms	11,290,000	11,329,000	7,805,000	3,285,000	18,000	13,000	44,000	68,000	22,000	73,000	30
31	4 rooms	23,036,000	23,169,000	14,817,000	7,922,000	23,000	65,000	54,000	135,000	78,000	74,000	31
32	5 rooms	29,888,000	29,870,000	16,382,000	13,073,000	18,000	104,000	35,000	151,000	53,000	54,000	32
33	6 rooms	27,480,000	27,216,000	13,855,000	13,102,000	8,000	35,000	35,000	88,000	38,000	55,000	33
34	7 rooms	17,877,000	17,829,000	8,011,000	9,701,000	4,000	21,000	16,000	33,000	6,000	37,000	34
35	8 rooms	10,623,000	10,658,000	4,496,000	6,112,000	3,000	0	7,000	26,000	0	14,000	35
36	9 rooms	4,629,000	4,673,000	1,596,000	3,059,000	0	0	2,000	5,000	4,000	8,000	36
37	10 rooms or more	3,286,000	3,289,000	1,519,000	1,752,000	7,000	3,000	0	0	0	8,000	37

Row	A	B	C	D	E	F	G	H	I	J	K	Row
	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	
	Bedrooms											
38	None	1,265,000	1,313,000	712,000	481,000	10,000	0	62,000	10,000	2,000	35,000	38
39	1	14,690,000	14,826,000	12,091,000	2,444,000	31,000	10,000	50,000	77,000	33,000	89,000	39
40	2	34,514,000	34,690,000	28,322,000	5,800,000	33,000	81,000	66,000	193,000	101,000	94,000	40
41	3	53,734,000	53,447,000	45,270,000	7,621,000	11,000	129,000	53,000	196,000	58,000	109,000	41
42	4 or more	25,909,000	25,835,000	21,478,000	4,194,000	15,000	22,000	23,000	42,000	17,000	44,000	42
43	Multiunit structures	31,817,000	32,613,000	32,137,000	0	48,000	3,000	127,000	105,000	68,000	126,000	43
	Stories in Structures											
44	1	NA	3,640,000	3,589,000	0	9,000	0	10,000	15,000	4,000	13,000	44
45	2	NA	13,372,000	13,147,000	0	19,000	3,000	41,000	70,000	40,000	53,000	45
46	3	NA	8,808,000	8,721,000	0	6,000	0	23,000	9,000	15,000	34,000	46
47	4 to 6	NA	4,183,000	4,085,000	0	9,000	0	48,000	10,000	4,000	25,000	47
48	7 or more	NA	2,610,000	2,595,000	0	4,000	0	4,000	0	5,000	1,000	48
	Region											
49	Northeast	23,316,000	23,482,000	23,210,000	0	14,000	10,000	64,000	40,000	44,000	100,000	49
50	Midwest	29,403,000	29,975,000	29,605,000	0	16,000	32,000	46,000	143,000	48,000	84,000	50
51	South	49,372,000	49,307,000	48,450,000	0	36,000	180,000	95,000	302,000	107,000	137,000	51
52	West	28,021,000	27,348,000	27,148,000	0	34,000	19,000	50,000	33,000	12,000	51,000	52
	Metro Status											
53	Inside metro area	102,679,000	97,032,000	96,022,000	0	82,000	81,000	176,000	285,000	142,000	245,000	53
54	In central cities	37,604,000	36,476,000	36,028,000	0	35,000	8,000	94,000	124,000	83,000	105,000	54
55	In suburbs	65,075,000	60,556,000	59,995,000	0	47,000	73,000	82,000	161,000	59,000	140,000	55
56	Outside metro area	27,433,000	33,079,000	32,391,000	0	19,000	161,000	79,000	234,000	69,000	127,000	56

**Forward-Looking Table B: Unit Quality**

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
1	Occupied Units	111,806,000	111,806,000	102,030,000	8,946,000	49,000	151,000	111,000	263,000	82,000	174,000	1
	Kitchen											
2	With complete kitchen	110,054,000	110,067,000	99,205,000	10,083,000	44,000	151,000	90,000	253,000	74,000	167,000	2
3	Lacking complete kitchen facilities	1,751,000	1,739,000	206,000	1,481,000	5,000	0	21,000	10,000	8,000	8,000	3
	Plumbing											
4	Plumbing	110,574,000	110,538,000	99,808,000	9,932,000	47,000	142,000	111,000	255,000	82,000	161,000	4
5	Lack some plumbing	1,232,000	1,268,000	84,000	1,151,000	3,000	9,000	0	8,000	0	13,000	5
6	No hot piped water	113,000	109,000	45,000	54,000	0	0	0	5,000	0	5,000	6
7	No bathtub/shower	113,000	112,000	41,000	63,000	3,000	0	0	0	0	5,000	7
8	No flush toilet	102,000	99,000	42,000	50,000	3,000	0	0	0	0	5,000	8
9	No exclusive use	1,065,000	1,096,000	15,000	1,061,000	0	9,000	0	3,000	0	8,000	9
	Water											
10	Public/private water	98,027,000	96,992,000	88,127,000	8,179,000	49,000	105,000	95,000	214,000	71,000	151,000	10
11	Well	13,430,000	14,417,000	13,118,000	1,163,000	0	46,000	14,000	43,000	10,000	23,000	11
12	Other water source	349,000	396,000	308,000	81,000	0	0	3,000	5,000	0	0	12
	Sewer											
13	Public sewer	89,467,000	88,857,000	78,991,000	9,271,000	46,000	72,000	90,000	195,000	66,000	127,000	13
14	Septic tank/cesspool	22,307,000	22,916,000	18,989,000	3,691,000	3,000	80,000	21,000	68,000	16,000	47,000	14
15	Other	31,000	33,000	12,000	21,000	0	0	0	0	0	0	15



	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/ merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
16	Severe Problems	1,864,000	1,880,000	165,000	1,673,000	5,000	9,000	0	15,000	0	13,000	16
17	Plumbing	1,232,000	1,268,000	84,000	1,151,000	3,000	9,000	0	8,000	0	13,000	17
18	Heating	545,000	533,000	12,000	512,000	3,000	0	0	7,000	0	0	18
19	Electric	71,000	73,000	54,000	19,000	0	0	0	0	0	0	19
20	Upkeep	74,000	70,000	0	70,000	0	0	0	0	0	0	20
21	Moderate Problems	3,893,000	3,870,000	1,044,000	2,716,000	5,000	17,000	26,000	41,000	10,000	10,000	21
22	Plumbing	164,000	179,000	3,000	176,000	0	0	0	0	0	0	22
23	Heating	1,073,000	1,125,000	818,000	269,000	0	17,000	5,000	16,000	0	0	23
24	Kitchen	1,177,000	1,739,000	206,000	1,481,000	5,000	0	21,000	10,000	8,000	8,000	24
25	Upkeep	1,629,000	1,247,000	126,000	1,077,000	0	0	0	36,000	3,000	5,000	25

**Forward-Looking Table C: Occupant Characteristics**

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
1	Occupied Units	111,806,000	111,806,000	102,030,000	8,946,000	49,000	151,000	111,000	263,000	82,000	174,000	1
	Age											
2	Under 65	88,712,000	86,064,000	74,452,000	10,943,000	44,000	108,000	88,000	220,000	69,000	141,000	2
3	65 to 74	11,938,000	13,084,000	9,003,000	4,014,000	3,000	9,000	5,000	19,000	10,000	21,000	3
4	75 or older	11,157,000	12,658,000	9,872,000	2,692,000	3,000	34,000	18,000	24,000	3,000	12,000	4
	Children											
5	Some	38,201,000	37,136,000	26,736,000	10,113,000	10,000	63,000	31,000	95,000	31,000	57,000	5
6	None	73,604,000	74,670,000	61,801,000	12,325,000	39,000	88,000	80,000	168,000	51,000	117,000	6
	Race/Origin											
7	White	91,137,000	92,159,000	81,697,000	9,818,000	36,000	137,000	95,000	188,000	51,000	136,000	7
8	Hispanic	11,804,000	12,618,000	9,568,000	2,966,000	5,000	14,000	13,000	20,000	20,000	13,000	8
9	Non-Hispanic	79,333,000	79,541,000	69,792,000	9,189,000	31,000	124,000	82,000	168,000	31,000	123,000	9
10	Black	13,993,000	12,909,000	10,014,000	2,736,000	13,000	14,000	12,000	66,000	31,000	24,000	10
11	Hispanic	384,000	353,000	140,000	213,000	0	0	0	0	0	0	11
12	Non-Hispanic	13,609,000	12,557,000	9,794,000	2,603,000	13,000	14,000	12,000	66,000	31,000	24,000	12
13	American Indian, Eskimo, Aleut	968,000	959,000	612,000	347,000	0	0	0	0	0	0	13
14	Asian	4,003,000	4,056,000	3,093,000	947,000	0	0	3,000	3,000	0	12,000	14
15	Pacific Islander	281,000	283,000	159,000	123,000	0	0	1,000	0	0	0	15
16	Two or more races	1,423,000	1,439,000	917,000	514,000	0	0	0	6,000	0	3,000	16
17	Total Hispanics	12,739,000	13,564,000	10,451,000	3,029,000	5,000	14,000	13,000	20,000	20,000	13,000	17

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
	Income Source											
18	Wages and salaries	82,121,000	80,290,000	63,232,000	16,493,000	31,000	113,000	58,000	184,000	49,000	131,000	18
19	Self-employed	12,966,000	12,889,000	5,179,000	7,627,000	3,000	11,000	18,000	16,000	5,000	29,000	19
20	Social security or pension	NA	30,915,000	22,996,000	7,721,000	11,000	58,000	25,000	50,000	16,000	38,000	20
21	Dividend, interest, or rent	NA	30,760,000	14,351,000	16,321,000	14,000	8,000	23,000	18,000	5,000	21,000	21
22	Welfare	2,049,000	2,022,000	336,000	1,668,000	0	3,000	3,000	3,000	8,000	3,000	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 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
1	Occupied Units		111,806,000	102,030,000	8,946,000	49,000	151,000	111,000	263,000	82,000	174,000	1
	Tenure											
2	Owner occupied	76,428,000	76,428,000	68,281,000	7,722,000	22,000	109,000	26,000	145,000	29,000	94,000	2
3	Homeownership rate	68.4%	68.4%									3
4	Renter occupied	35,378,000	35,378,000	28,035,000	6,938,000	28,000	42,000	85,000	118,000	53,000	80,000	4
	Renter Monthly Housing Costs											
5	No cash rent	2,037,000	1,756,000	654,000	1,071,000	3,000	6,000	5,000	13,000	0	5,000	5
6	Less than \$350	2,938,000	3,110,000	1,574,000	1,465,000	3,000	9,000	16,000	20,000	13,000	11,000	6
7	\$350 to \$599	5,857,000	5,850,000	2,420,000	3,350,000	8,000	8,000	10,000	32,000	3,000	19,000	7
8	\$600 to \$799	7,517,000	7,260,000	3,250,000	3,924,000	8,000	5,000	22,000	28,000	13,000	10,000	8
9	\$800 to \$1,249	10,837,000	10,977,000	6,048,000	4,825,000	5,000	14,000	19,000	21,000	23,000	23,000	9
10	\$1,250 or more	6,192,000	6,425,000	3,810,000	2,581,000	3,000	0	13,000	3,000	3,000	13,000	10
	Renter Household Income											
11	Less than \$15,000	9,284,000	9,266,000	4,126,000	4,984,000	13,000	20,000	24,000	53,000	23,000	25,000	11
12	\$15,000 to \$29,999	8,921,000	8,876,000	2,744,000	6,037,000	5,000	3,000	31,000	34,000	8,000	15,000	12
13	\$30,000 to \$49,999	7,915,000	7,892,000	1,899,000	5,924,000	0	8,000	13,000	13,000	15,000	20,000	13
14	\$50,000 to \$99,999	7,234,000	7,296,000	2,274,000	4,963,000	8,000	0	13,000	19,000	8,000	13,000	14
15	\$100,000 or more	2,024,000	2,047,000	429,000	1,592,000	3,000	12,000	5,000	0	0	8,000	15

	A	B	C	D	E	F	G	H	I	J	K	
Row	Characteristics	Published numbers	Present in 2009	2009 units present in 2011	Change in characteristics	2009 units lost due to conversion/merger	2009 house or mobile home moved out	2009 units changed to nonresidential use	2009 units lost through demolition or disaster	2009 units badly damaged or condemned	2009 units lost in other ways	Row
	Owner Monthly Housing Costs											
16	Less than \$350	10,976,000	9,800,000	3,990,000	5,698,000	0	46,000	2,000	50,000	5,000	8,000	16
17	\$350 to \$599	12,747,000	12,775,000	5,346,000	7,334,000	3,000	34,000	6,000	31,000	0	21,000	17
18	\$600 to \$799	7,331,000	7,747,000	2,224,000	5,474,000	3,000	12,000	3,000	18,000	0	13,000	18
19	\$800 to \$1,249	15,295,000	15,160,000	6,816,000	8,284,000	5,000	12,000	3,000	22,000	11,000	8,000	19
20	\$1,250 or more	30,078,000	30,946,000	22,255,000	8,582,000	11,000	5,000	13,000	24,000	13,000	43,000	20
	Owner Household Income											
21	\$0 to \$14,999	7,211,000	7,509,000	2,694,000	4,744,000	3,000	12,000	11,000	36,000	8,000	3,000	21
22	\$15,000 to \$29,999	10,740,000	10,997,000	3,902,000	7,010,000	3,000	32,000	0	27,000	5,000	19,000	22
23	\$30,000 to \$49,999	13,934,000	14,107,000	4,938,000	9,079,000	6,000	40,000	3,000	28,000	5,000	8,000	23
24	\$50,000 to \$99,999	25,272,000	24,863,000	12,087,000	12,652,000	3,000	17,000	10,000	41,000	8,000	45,000	24
25	\$100,000 or more	19,271,000	18,952,000	11,171,000	7,727,000	8,000	8,000	3,000	13,000	3,000	20,000	25

**Backward-Looking Table A: Housing Characteristics**

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
1	Housing Stock	132,419,000	132,419,000	129,573,000	0	73,000	174,000	183,000	2,057,000	226,000	134,000	1
	Occupancy Status											
2	Occupied	114,907,000	114,907,000	103,074,000	9,706,000	64,000	115,000	80,000	1,720,000	75,000	73,000	2
3	Vacant	13,379,000	13,379,000	5,109,000	7,713,000	5,000	34,000	88,000	268,000	117,000	46,000	3
4	Seasonal	4,133,000	4,133,000	2,185,000	1,787,000	5,000	25,000	14,000	69,000	35,000	14,000	4
	Units in Structure											
5	1, detached	82,974,000	83,017,000	81,412,000	0	20,000	12,000	82,000	1,283,000	125,000	83,000	5
6	1, attached	7,768,000	6,774,000	6,463,000	0	11,000	0	20,000	250,000	17,000	14,000	6
7	2 to 4	10,678,000	10,581,000	10,407,000	0	39,000	1,000	29,000	59,000	25,000	22,000	7
8	5 to 9	6,354,000	6,454,000	6,384,000	0	0	0	11,000	46,000	12,000	1,000	8
9	10 to 19	6,028,000	6,243,000	6,148,000	0	1,000	2,000	11,000	66,000	9,000	5,000	9
10	20 to 49	4,474,000	4,725,000	4,590,000	0	0	0	4,000	123,000	6,000	2,000	10
11	50 or more	5,096,000	5,577,000	5,311,000	0	3,000	0	20,000	230,000	6,000	7,000	11
12	Manufactured/mobile home	9,049,000	9,049,000	8,858,000	0	0	159,000	6,000	1,000	26,000	0	12

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
	Year Structure Built											
13	2010–2014	720,000	704,000	8,000	0	7,000	3,000	0	686,000	0	0	13
14	2005–2009	8,267,000	8,667,000	7,464,000	0	1,000	19,000	15,000	1,146,000	7,000	14,000	14
15	2000–2004	9,250,000	9,966,000	9,721,000	0	0	18,000	5,000	216,000	0	6,000	15
16	1995–1999	8,948,000	11,518,000	11,460,000	0	4,000	39,000	8,000	0	0	6,000	16
17	1990–1994	7,206,000	4,894,000	4,868,000	0	0	18,000	6,000	0	0	2,000	17
18	1985–1989	9,014,000	8,986,000	8,967,000	0	0	3,000	3,000	0	5,000	8,000	18
19	1980–1984	7,715,000	7,729,000	7,679,000	0	7,000	19,000	7,000	0	11,000	6,000	19
20	1975–1979	13,579,000	13,817,000	13,720,000	0	7,000	13,000	22,000	0	34,000	22,000	20
21	1970–1974	11,176,000	11,008,000	10,930,000	0	2,000	34,000	14,000	0	21,000	6,000	21
22	1960–1969	15,405,000	15,035,000	14,980,000	0	7,000	6,000	12,000	3,000	15,000	11,000	22
23	1950–1959	13,455,000	12,665,000	12,595,000	0	5,000	0	30,000	2,000	24,000	9,000	23
24	1940–1949	7,836,000	7,713,000	7,672,000	0	2,000	2,000	12,000	0	18,000	8,000	24
25	1930–1939	5,536,000	5,652,000	5,600,000	0	4,000	0	12,000	0	23,000	14,000	25
26	1920–1929	5,323,000	5,106,000	5,067,000	0	7,000	0	7,000	0	14,000	11,000	26
27	1919 or earlier	8,989,000	8,962,000	8,842,000	0	19,000	0	31,000	4,000	54,000	11,000	27

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
	Rooms											
28	1	601,000	665,000	276,000	353,000	3,000	0	17,000	4,000	2,000	10,000	28
29	2	1,404,000	1,342,000	510,000	747,000	2,000	3,000	11,000	32,000	23,000	13,000	29
30	3	11,433,000	11,420,000	7,931,000	3,168,000	35,000	32,000	29,000	158,000	40,000	26,000	30
31	4	23,636,000	23,799,000	15,111,000	8,248,000	24,000	31,000	43,000	250,000	59,000	32,000	31
32	5	30,440,000	30,297,000	16,620,000	13,025,000	3,000	55,000	18,000	524,000	29,000	24,000	32
33	6	27,779,000	27,769,000	13,925,000	13,306,000	3,000	37,000	32,000	414,000	39,000	13,000	33
34	7	17,868,000	17,938,000	8,062,000	9,556,000	2,000	3,000	11,000	274,000	19,000	11,000	34
35	8	10,749,000	10,731,000	4,494,000	6,024,000	0	13,000	14,000	177,000	7,000	3,000	35
36	9	4,854,000	5,000,000	1,594,000	3,269,000	0	0	5,000	130,000	2,000	0	36
37	10 or more	3,654,000	3,458,000	1,522,000	1,832,000	0	0	3,000	94,000	4,000	3,000	37
	Bedrooms											
38	None	1,413,000	1,412,000	706,000	622,000	3,000	0	23,000	27,000	18,000	14,000	38
39	1	14,924,000	15,004,000	12,270,000	2,334,000	45,000	35,000	37,000	193,000	50,000	41,000	39
40	2	35,083,000	35,062,000	28,768,000	5,665,000	20,000	35,000	53,000	405,000	74,000	43,000	40
41	3	54,245,000	54,220,000	45,724,000	7,447,000	2,000	88,000	40,000	840,000	55,000	24,000	41
42	4 or more	26,755,000	26,722,000	21,558,000	4,479,000	3,000	16,000	30,000	592,000	30,000	12,000	42
43	Multiunit structures	NA	33,579,000	32,841,000	0	42,000	3,000	75,000	524,000	58,000	37,000	42
	Stories in Structure											
44	1	NA	4,046,000	3,982,000	0	5,000	1,000	16,000	27,000	13,000	2,000	43
45	2	NA	13,703,000	13,520,000	0	23,000	2,000	21,000	99,000	22,000	17,000	44
46	3	NA	9,031,000	8,818,000	0	7,000	0	10,000	176,000	11,000	9,000	45
47	4 to 6	NA	4,244,000	4,049,000	0	5,000	0	19,000	155,000	10,000	6,000	46
48	7 or more	NA	2,555,000	2,472,000	0	3,000	0	9,000	66,000	2,000	4,000	47



	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
	Census Regions											
49	Northeast	23,717,000	22,857,000	22,525,000	0	31,000	6,000	42,000	195,000	28,000	30,000	48
50	Midwest	29,545,000	30,050,000	29,621,000	0	12,000	45,000	38,000	267,000	46,000	22,000	49
51	South	50,381,000	50,669,000	49,460,000	0	9,000	96,000	67,000	885,000	123,000	29,000	50
52	West	28,776,000	28,843,000	27,968,000	0	22,000	27,000	35,000	709,000	30,000	52,000	51
	Metropolitan/ Nonmetropolitan											
53	Inside metropolitan areas	104,017,000	98,617,000	96,553,000	0	55,000	84,000	139,000	1,533,000	146,000	107,000	52
54	In central cities	38,599,000	37,182,000	36,312,000	0	33,000	27,000	73,000	588,000	87,000	63,000	53
55	Not in central cities	65,418,000	61,436,000	60,242,000	0	23,000	57,000	67,000	945,000	59,000	44,000	54
56	Outside metropolitan areas	28,402,000	33,802,000	33,020,000	0	18,000	90,000	43,000	524,000	80,000	27,000	55

**Backward-Looking Table B: Unit Quality**

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
1	Occupied Units	114,907,000	114,907,000	103,074,000	9,706,000	64,000	115,000	80,000	1,720,000	75,000	73,000	1
2	With complete kitchen	112,898,000	112,922,000	100,217,000	10,615,000	54,000	112,000	72,000	1,704,000	72,000	73,000	2
3	Lacking complete kitchen facilities	2,010,000	1,985,000	208,000	1,739,000	9,000	3,000	8,000	16,000	2,000	0	3
	Plumbing Facilities											
4	With all plumbing facilities	113,472,000	113,440,000	100,852,000	10,480,000	61,000	109,000	77,000	1,718,000	69,000	73,000	4
5	Lacking some or all plumbing facilities	1,435,000	1,467,000	86,000	1,362,000	3,000	6,000	3,000	2,000	5,000	0	5
6	No hot piped water	189,000	216,000	47,000	161,000	3,000	0	3,000	0	3,000	0	6
7	No bathtub and no shower	147,000	167,000	42,000	117,000	3,000	3,000	3,000	0	0	0	7
8	No flush toilet	122,000	128,000	42,000	80,000	3,000	0	3,000	0	0	0	8
9	No exclusive use	1,183,000	1,175,000	15,000	1,151,000	0	3,000	0	2,000	3,000	0	9
	Primary Source of Water											
10	Public or private system	101,397,000	100,105,000	88,983,000	9,163,000	57,000	91,000	66,000	1,618,000	63,000	62,000	10
11	Well serving 1 to 5 units	13,131,000	14,379,000	13,297,000	925,000	7,000	21,000	11,000	97,000	11,000	9,000	11
12	Other	380,000	424,000	313,000	97,000	0	3,000	3,000	5,000	0	2,000	12

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
	Means of Sewage Disposal											
13	Public sewer	92,636,000	92,021,000	79,650,000	10,609,000	46,000	59,000	64,000	1,481,000	52,000	60,000	13
14	Septic tank or cesspool	NA	22,833,000	19,315,000	3,156,000	15,000	56,000	16,000	239,000	22,000	14,000	14
15	Other	NA	53,000	12,000	39,000	3,000	0	0	0	0	0	15
16	Severe physical problems	2,125,000	2,146,000	167,000	1,957,000	3,000	6,000	3,000	5,000	5,000	0	16
17	Plumbing	1,435,000	1,467,000	86,000	1,362,000	3,000	6,000	3,000	2,000	5,000	0	17
18	Heating	602,000	589,000	11,000	572,000	0	0	0	3,000	3,000	0	18
19	Electric	65,000	74,000	55,000	19,000	0	0	0	0	0	0	19
20	Upkeep	79,000	82,000	0	82,000	0	0	0	0	0	0	20
21	Moderate physical problems	4,199,000	4,088,000	1,066,000	2,972,000	9,000	6,000	5,000	19,000	2,000	8,000	21
22	Plumbing	215,000	238,000	3,000	233,000	2,000	0	0	0	0	0	22
23	Heating	1,041,000	1,154,000	841,000	304,000	0	3,000	0	3,000	0	3,000	23
24	Upkeep	1,833,000	1,985,000	208,000	1,739,000	9,000	3,000	8,000	16,000	2,000	0	24
25	Kitchen	1,242,000	1,243,000	126,000	1,109,000	0	3,000	0	0	0	5,000	25

**Backward-Looking Table C: Occupant Characteristics**

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
1	Occupied Units	114,907,000	114,907,000	103,074,000	9,706,000	64,000	115,000	80,000	1,720,000	75,000	73,000	1
	Age of Householder											
2	Less than 65 years old	89,849,000	87,965,000	75,259,000	10,822,000	54,000	103,000	71,000	1,530,000	69,000	58,000	2
3	65 to 74 years old	13,168,000	13,872,000	9,080,000	4,638,000	7,000	9,000	5,000	127,000	0	5,000	3
4	75 years old and over	11,890,000	13,070,000	9,964,000	3,017,000	2,000	3,000	4,000	64,000	6,000	10,000	4
	Households & Children											
5	Households with children	37,573,000	37,355,000	26,969,000	9,491,000	13,000	39,000	39,000	752,000	26,000	28,000	5
6	Households with no children	77,334,000	77,552,000	62,423,000	13,897,000	51,000	76,000	42,000	969,000	49,000	46,000	6

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
	Race and Hispanic Origin											
7	White alone	92,820,000	93,988,000	82,575,000	9,804,000	43,000	98,000	58,000	1,299,000	53,000	58,000	7
8	Hispanic	12,630,000	13,177,000	9,677,000	3,214,000	12,000	9,000	13,000	211,000	18,000	23,000	8
9	Non-Hispanic	80,190,000	80,811,000	70,521,000	8,967,000	31,000	88,000	45,000	1,089,000	36,000	35,000	9
10	Black alone	14,694,000	13,517,000	10,074,000	3,135,000	15,000	18,000	19,000	228,000	18,000	11,000	10
11	Hispanic	535,000	417,000	139,000	268,000	0	0	2,000	8,000	0	0	11
12	Non-Hispanic	14,159,000	13,100,000	9,854,000	2,949,000	15,000	18,000	17,000	220,000	18,000	11,000	12
13	Am Indian or Alaska Native	965,000	1,011,000	627,000	360,000	0	0	0	20,000	3,000	0	13
14	Asian alone	4,620,000	4,629,000	3,081,000	1,383,000	1,000	0	0	158,000	0	5,000	14
15	Pacific Islander alone	328,000	299,000	160,000	129,000	2,000	0	0	8,000	0	0	15
16	Two or more races	1,480,000	1,463,000	927,000	525,000	2,000	0	3,000	6,000	0	0	16
17	Hispanic or Latino (any race)	13,841,000	14,282,000	10,557,000	3,412,000	12,000	9,000	16,000	236,000	18,000	23,000	17
	Income Sources of Families and Primary Individuals											
18	Wages and salaries	81,430,000	80,140,000	63,834,000	14,652,000	38,000	81,000	53,000	1,385,000	48,000	50,000	18
19	Self-employment	13,263,000	13,429,000	5,229,000	7,931,000	9,000	14,000	9,000	226,000	5,000	7,000	19
20	Social security or pension	NA	32,235,000	23,233,000	8,649,000	10,000	28,000	12,000	268,000	22,000	15,000	20
21	Dividends, interest, or rent	NA	28,108,000	14,376,000	13,267,000	5,000	9,000	14,000	418,000	8,000	12,000	21
22	Public assistance or public welfare	2,393,000	2,264,000	343,000	1,890,000	0	3,000	10,000	17,000	0	3,000	22

**Backward-Looking Table D: Income and Housing Cost**

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
1	Occupied Units	114,907,000	114,907,000	103,074,000	9,706,000	64,000	115,000	80,000	1,720,000	75,000	73,000	1
	Tenure											
2	Owner-occupied	76,091,000	76,091,000	68,745,000	5,955,000	7,000	94,000	26,000	1,203,000	36,000	25,000	2
3	Homeownership rate	66.2%	66.2%									3
4	Renter-occupied	38,816,000	38,816,000	28,585,000	9,494,000	57,000	21,000	54,000	517,000	39,000	48,000	4
	Renter Monthly Housing Costs											
5	No cash rent	2,271,000	1,997,000	667,000	1,285,000	3,000	3,000	12,000	13,000	6,000	9,000	5
6	Less than \$350	3,094,000	3,246,000	1,612,000	1,603,000	6,000	0	0	23,000	0	3,000	6
7	\$350 to \$599	5,702,000	5,791,000	2,493,000	3,213,000	19,000	6,000	8,000	39,000	11,000	3,000	7
8	\$600 to \$799	7,823,000	7,816,000	3,349,000	4,361,000	10,000	7,000	14,000	59,000	8,000	8,000	8
9	\$800 to \$1,249	12,072,000	12,148,000	6,166,000	5,761,000	9,000	3,000	12,000	174,000	3,000	20,000	9
10	\$1,250 or more	7,855,000	7,818,000	3,844,000	3,726,000	10,000	3,000	8,000	209,000	12,000	7,000	10
	Renter Household Income											
11	Less than \$15,000	10,495,000	10,899,000	4,219,000	6,515,000	21,000	3,000	13,000	103,000	14,000	12,000	11
12	\$15,000 to \$29,999	9,563,000	9,962,000	2,806,000	6,974,000	12,000	3,000	16,000	120,000	10,000	19,000	12
13	\$30,000 to \$49,999	8,166,000	7,843,000	1,940,000	5,750,000	10,000	8,000	8,000	109,000	8,000	10,000	13
14	\$50,000 to \$99,999	8,015,000	7,838,000	2,316,000	5,346,000	12,000	7,000	14,000	133,000	3,000	8,000	14
15	\$100,000 or more	2,577,000	2,275,000	428,000	1,785,000	2,000	0	3,000	52,000	5,000	0	15

	A	B	C	D	E	F	G	H	I	J	K	
Row	2011 Characteristics	Published	Present in 2011	2011 units present in 2009	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 2009 stock	2011 units added in other ways	Row
	Owner Monthly Housing Costs											
16	Less than \$350	9,284,000	8,027,000	4,131,000	3,816,000	5,000	27,000	0	35,000	11,000	2,000	16
17	\$350 to \$599	12,820,000	12,774,000	5,415,000	7,234,000	2,000	25,000	0	86,000	3,000	10,000	17
18	\$600 to \$799	8,237,000	8,239,000	2,247,000	5,905,000	0	13,000	0	68,000	4,000	3,000	18
19	\$800 to \$1,249	15,879,000	15,770,000	6,883,000	8,647,000	0	20,000	8,000	201,000	8,000	3,000	19
20	\$1,250 or more	29,873,000	31,281,000	22,124,000	8,300,000	0	9,000	18,000	813,000	10,000	8,000	20
	Owner Household Income											
21	\$0 to \$14,999	7,437,000	7,701,000	2,753,000	4,865,000	1,000	13,000	2,000	56,000	11,000	0	21
22	\$15,000 to \$29,999	11,095,000	11,580,000	3,977,000	7,479,000	0	28,000	3,000	82,000	9,000	2,000	22
23	\$30,000 to \$49,999	13,847,000	14,065,000	5,017,000	8,836,000	0	31,000	3,000	167,000	4,000	8,000	23
24	\$50,000 to \$99,999	24,518,000	24,357,000	12,183,000	11,671,000	5,000	23,000	8,000	443,000	13,000	12,000	24
25	\$100,000 or more	19,194,000	18,389,000	11,110,000	6,811,000	1,000	0	10,000	454,000	0	2,000	25

## Appendix C: Consistency Checks & Weighting

### *Internal and External Checks*

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

- For each row, we tested whether the sum of possible outcomes (columns D through K) equaled the number of units present in the base year (column C). In every case, equality was achieved, except for differences created by rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13–27) 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 break-out rows for all columns except D and E. The difference between column D in the parent row and the sum of column D for the break-out rows should equal the negative of the difference between column E in the parent row and the sum of column E for the break-out rows. In every case, equality was achieved, except for differences created by rounding.

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

### *Weighting*

CINCH separates the AHS samples in 2009 and 2011 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 2007 housing stock but are not part of the 2009 housing stock (LOSSES), and units that are not part of the 2007 housing stock but are part of the 2009 housing stock (ADDITIONS). ADDITIONS are split into NEW CONSTRUCTION and OTHER ADDITIONS (structures that existed in 2007 but were not in the housing stock and other cases).

Because CINCH looks at various subsets of the housing stock, we need to know the characteristics of units and their occupants. Therefore, we can use only those SAMES observations that were interviewed in both years. For the same reason, we can use only those LOSSES that were interviewed in 2009 and those ADDITIONS that were interviewed in 2011.

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



For the backward-looking analysis, we started with the AHS pure weights. We used the AHS weighted counts in 2011 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 2011 and our estimates on NEW CONSTRUCTION and OTHER ADDITIONS to create new pure weights for the interviewed SAMES. We then adjusted the weights for SAMES, NEW CONSTRUCTION, and OTHER ADDITIONS to equal AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 2009. These matches were performed separately for mobile homes and all other structure types.

The logic behind the weighting and the procedures used to create the weights is explained in *Weighting Strategy for 2009–2011 CINCH Analysis*.