

**American Housing Survey**

**Components of Inventory Change and  
Rental Dynamics Analysis:  
Memphis, 2004–2011**

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## ***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 as 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.

This report describes how the housing stock in the Memphis metropolitan area changed between 2004 and 2011, with particular emphasis on affordable rental housing. The study uses data from the American Housing Survey, which collected detailed information on housing units in Memphis and on their occupants in both 2004 and 2011.

In 2004 the Memphis metropolitan area contained 489,200 housing units, including vacant units. By 2011 the number of housing units had increased to 552,500. Part of this increase was due to a redefinition of the metropolitan area that added three Mississippi counties. We estimate that the 2011 count of housing units for the metropolitan area as defined in 2004 would be 524,700. This represents an overall increase of 7.3 percent, which translates to an average annual increase of 1.0 percent over the 7-year period.

Between 2004 and 2011, 11,100 units left the housing stock. Of these, 5,300 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 4,900 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 900 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations. Demolitions and natural disasters accounted for 5,100 of the permanent losses, while mergers and conversions contributed another 200 permanent losses.

In the period between the 2004 and the 2011 AHS surveys, 70,800 units were added to the housing stock. Ninety-two percent of these additions were newly constructed units. The 2011 AHS did track move-ins of mobile homes in Memphis, a factor that contributed 3,100 units. No new units were formed from the conversion or merger of 2004 units. We classified 1,800 units as recovered because these units had been in the housing stock at some point but were classified in 2004 as nonresidential (400) or uninhabitable (1,400). Finally, 600 units were added in other unclassified ways.

Losses and additions varied across portions of the Memphis housing market defined by the characteristics of the unit or its occupants. We observed the following patterns, which were both atypical of the overall housing stock and statistically significant:

- Units occupied in 2004 had a loss rate that was lower and statistically different than the overall loss rate, while vacant units had a loss rate that was substantially higher and statistically different than the overall rate.
- The loss rate was lower among more recently built units and higher among older units.

- Single-family detached units had a lower-than-average loss rate, while units in small multifamily structures (2–4 units or 5–9 units) or 2-story multifamily structures had much higher loss rates.
- Smaller units (3 rooms) experienced high loss rates, whereas larger units (7 or 8 rooms or 4 or more bedrooms) had lower rates.
- Loss rates were high among units with severe or moderate physical problems in 2004.
- Units occupied in 2004 by households with White householders or householders between 65 and 74 years old had low loss rates, but units with Black householders had high loss rates.
- Units that were owner-occupied in 2004 experienced a low loss rate, but units that were renter-occupied had a high loss rate. Among 2004 rental units, those with low rents (less than \$600) and those occupied by low-income households (less than \$15,000) had high loss rates. Among owner-occupied units in 2004, household income and housing costs had a small impact on loss rates; as expected, higher income and higher housing costs were associated with lower loss rates.
- Overall, units in multifamily structures experienced a low rate of addition, and this was particularly the case among units in small multifamily structures, measured in terms of either number of units in the structure or number of floors. Units in large multifamily buildings (4–6 floors) had a rate of addition that was substantially higher than the average.
- In general, small units (3–5 rooms or 2 bedrooms) had low rates of addition, while large units (8 or more rooms or 4 or more bedrooms) experienced a high rate. Units with only 2 rooms were an exception to this generalization.
- Rates of addition were high among units using wells and septic tanks.
- New additions to the stock were underrepresented among units in 2011 with severe physical problems and some types of moderate physical problems.
- Among units occupied in 2011 by households with Hispanic or Asian householders, the rates of addition were higher than average.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units but not statistically different. Among owner-occupied units, those occupied by lower income owners (\$15,000–\$49,999) and those with lower monthly housing costs (less than \$800) had lower rates of addition, while those occupied by high-income owners (\$50,000 or more) and those with high monthly housing costs (\$1,250 or more) had higher-than-average rates of addition.

- The rate of addition was low among units that were renter-occupied in 2011 and, among rental units, particularly low for those occupied by households earning less than \$50,000 and those with low rents (\$600–\$1,249 per month). Units with no cash rent in 2011 were an exception, having a rate of addition almost twice that of all occupied units. Rates of addition were higher than normal among high-cost rentals (\$1,250 per month or more) and those occupied by households earning more than \$100,000.

The 2004 rental stock in Memphis was affordable. Of the 178,800 rental units in 2004, 89,400 were extremely low rent or very low rent units. In addition, 33,400 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 68.7 percent of the 2004 rental stock. The three highest rent categories comprised only 3 percent of the rental stock. Moves by 2004 rental units to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—50.5 percent of all 2004 units compared to 7.8 percent. By 2011, 20.6 percent of the rental units in 2004 were no longer in the rental stock. The largest proportion of these losses was due to changes in tenure.

The rental stock in Memphis was less affordable in 2011 than in 2004. Of the 205,000 rental units in 2011, 40,100 were extremely low rent or very low rent units. In addition, 25,600 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 32.0 percent of the 2011 rental stock. The three highest rent categories comprised 16.2 percent of the rental stock. Moves between 2004 and 2011 from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—43.7 percent of all 2011 units compared to 6.7 percent. Of the rental units in 2011, 31.4 percent were not rental in 2004. The largest proportion of these gains was due to changes in tenure.

# Components of Inventory Change and Rental Dynamics Analysis: Memphis, 2004–2011

## 1. Introduction

This report describes how the housing stock in the Memphis metropolitan area changed between 2004 and 2011, with particular emphasis on affordable rental housing. The study uses data from the American Housing Survey (AHS), which collected detailed information on housing units in Memphis and on their occupants in both 2004 and 2011.<sup>1</sup>

As part of its Components of Inventory Change (CINCH) program, the U.S. Department of Housing and Urban Development (HUD) has funded, for a number of years, similar studies of metropolitan areas to document changes in the American housing stock. These studies have traditionally included an assessment of changes in the rental housing market called rental dynamics. This paper is one of 29 metropolitan CINCH studies based on the information provided by the 2011 AHS.<sup>2</sup>

CINCH reports present both forward-looking analysis (what happened to the 2004 units by 2011) and backward-looking analysis (where the 2011 units came from in terms of 2004).<sup>3</sup> This paper repeats the analysis contained in the most recent CINCH and rental dynamics studies, but its organization differs from that of previous reports.

- Section 2 discusses data and related issues that affect the CINCH and rental dynamics analysis for Memphis.
- Section 3 explains the changes in the housing stock between 2004 and 2011 in terms of losses to the housing stock through demolitions or the other ways units can leave the housing stock and additions through new construction and other means.
- Section 4 looks at components of the housing stock that experienced losses or additions markedly different from the overall patterns of losses and additions.
- Section 5 breaks the rental housing stock into eight affordability categories and tracks what happened to units in each of those categories between 2004 and 2011.

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<sup>1</sup> Since 1973, the U.S. Department of Housing and Urban Development (HUD) and the Census Bureau have conducted an extensive survey of the American housing stock called the American Housing Survey (AHS). The AHS has two components: a national survey that, since 1985, has collected data every 2 years on the entire U.S. housing stock and a metropolitan component that, since 1985, has collected data at various times on the housing stock of 45 metropolitan areas. Both the national and metropolitan components use the same sample of housing units in successive surveys, making it possible to observe changes in units over time. The initial samples have been augmented in later years to account for units added by new construction or other means.

<sup>2</sup> HUD also funds CINCH studies of survey-to-survey changes in the national stock. At the national level, the Rental Dynamics studies are published separately. For a complete list of all CINCH studies, see <http://www.huduser.org/portal/datasets/cinch.html>.

<sup>3</sup> The forward-looking analysis was previously presented to HUD in December 2013. The data needed to produce the backward-looking analysis did not become available until after the allowed period of performance of the contract under which the previous report was completed.

- Section 6 summarizes the changes to the housing stock of the Memphis metropolitan area between 2004 and 2011.

The paper concludes with two appendices that contain analyses and data found in the body of previous CINCH reports.

- Appendix A explains the CINCH and rental dynamics methodologies.
- Appendix B contains the detailed CINCH and rental dynamics tables found in previous reports.

National economic conditions shaped in important ways the changes observed in this report. The 2004–2011 period began during a vigorous expansion (November 2001 to December 2007), included the recent harsh recession (December 2007 to June 2009), and ended with a period of lackluster recovery.

## ***2. Special Issues: Memphis***

Metropolitan areas are composed of counties or townships that are interrelated economically. The Office of Management and Budget periodically adjusts the composition of metropolitan areas as the economic relationships among counties change. In some cases, the AHS retains the metropolitan boundaries in effect when the original metropolitan sample was drawn; in other cases, the AHS will adjust the original sample to correspond to the new definition of the metropolitan area. A change in sample boundaries will affect the interpretation of CINCH analysis and its precision. The absolute sample size available to study changes between surveys determines how reliably the observed changes are measured.

### **Geography**

In 2004 the Memphis metropolitan area contained 489,200 housing units, including vacant units. By 2011 the number of housing units had increased to 552,500. Part of this increase was due to a redefinition of the metropolitan area that added three Mississippi counties (Marshall, Tate, and Tunica). Using the American Community Survey (2011, 5-year data) at the county level, we estimate that the 2011 count of housing units for the metropolitan area as defined in 2004 would be 524,700. This represents an overall increase of 7.3 percent, which translates to an average annual increase of 1.0 percent over the 7-year period.

The change in the geographical definition of Memphis affects the interpretation of the information presented in this report. Our analysis applies only to that portion of the metropolitan area that was common to the Memphis metropolitan area as defined in both 2004 and 2011, but the application to the common area is not precise, as explained in Appendix A.

### **Sample size**

Both CINCH and rental dynamics require that, if a sample unit is in both the 2004 and 2011 housing stock, it must be interviewed in both surveys to be included in the analysis. Other



analytical requirements also limit effective sample size. There are 2,325 sample units that were common to the 2004 and 2011 AHS Memphis surveys and satisfied all the analytical requirements.<sup>4</sup> Between 2004 and 2011, 74 sample units in the common area meeting the analytical requirements were lost to the stock; thus, the forward-looking analysis is based on a maximum of 2,399 sample units. Between 2004 and 2011, 323 sample units meeting the analytical requirements were added to the AHS survey to represent additions to the stock throughout the metropolitan area as defined in 2011; thus, the backward-looking analysis is based on a maximum of 2,648 sample units. In the forward-looking analysis, the average weight of a sample unit is approximately 204 units; in the backward-looking analysis, the average weight of a sample unit is approximately 209 units.

### ***Data reliability***

All CINCH analysis relies on two AHS variables: NOINT (why there was no interview), which, among other things, explains why a unit is temporarily or permanently out of the stock, and REUAD (why unit added), which explains why a sample unit entered the sample. Both variables require some detective work on the part of Census Bureau staff, and the longer the period between surveys, the more difficult the detective work. At the national level, the AHS data are collected every 2 years, so it is relatively easy to determine why a unit has been removed from or added to the sample. In the case of Memphis, 7 years separate the 2011 sample from the 2004 sample. As a result, explaining the loss or addition of sample units is challenging. This report is part of a series that compares the housing stock in 2011 to the housing stock of 7 metropolitan areas in 1998, 12 metropolitan areas in 2002, 8 metropolitan areas in 2004, and 2 metropolitan areas in 2009. We compared the pattern of changes across the 29 areas studied in these reports to the changes recorded between 2009 and 2011 at the national level. With respect to losses, the patterns are reasonably similar except for the role played by the movement of mobile homes. Mobile home move-outs are much more important in explaining losses at the national level. At both the national and metropolitan levels, the “other” category accounts for one-fifth to one-quarter of the losses. With respect to additions, new construction accounts for 72 percent of all additions at the national level but 94 percent at the metropolitan level. We suspect that data issues downplay the importance of “means other than new construction” at the metropolitan level.

## ***3. Changes to the Housing Stock: 2004–2011***

### **Losses between 2004 and 2011**

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.

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<sup>4</sup> The 2004 AHS surveyed 4,644 units in the Memphis metropolitan area; 3,007 of these units were in the 2011 AHS public use file (PUF). Of the 1,637 sample units no longer in the survey, 277 were legitimate temporary or permanent losses to the housing stock and were considered for the analysis. The remaining 1,360 cases are coded as “sample reduction for the current survey year” with no further explanation.

Table 1 reports that, between 2004 and 2011, only 11,100 units left the housing stock.<sup>5</sup> Of these, 5,300 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 4,900 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 900 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations.

**Table 1: Disposition of 2004 Memphis Housing Units in 2011<sup>6</sup>**

Present in 2004	489,200
2004 units present in 2011	478,100
<b>Units no longer in the stock</b>	<b>11,100</b>
2004 units lost due to conversion/merger	200
2004 house or mobile home moved out	0
2004 units lost through demolition or disaster	5,100
<b>Permanent losses</b>	<b>5,300</b>
2004 units changed to nonresidential use	1,300
2004 units badly damaged or condemned	3,700
<b>Temporary losses</b>	<b>4,900</b>
<b>2004 units lost in other ways</b>	<b>900</b>

Demolitions and natural disasters accounted for 5,100 of the permanent losses, while mergers and conversions contributed another 200 permanent losses. “Conversion” is the terminology used in the AHS for the splitting of a unit into two or more units. 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 of capital and land that formed the original unit; therefore, the movement of a mobile home is considered a permanent loss. Unfortunately, the 2011 AHS survey in Memphis did not track mobile home move-outs, probably because the long time between surveys makes it difficult to determine whether the current mobile home was the same mobile home as in 2004.

Sometimes houses are used for business purposes. Such commercial use 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.

Appendix B contains four forward-looking tables that break the overall stock into more than 100 subgroups, such as single-family detached houses or units occupied by Black householders in 2004. For each subgroup, these tables detail how many of the 2004 units in that subgroup are in the same subgroup in 2011, have moved into another subgroup, or have left the stock and how they left the stock. Section 4 looks across the Appendix B forward-looking tables and focuses on those subgroups that lost an unusually high or an unusually low number of units over the 2004–2011 period.

<sup>5</sup> With the caveats noted in Appendix A, this analysis applies to the area common to both the 2004 and 2011 definitions of the metropolitan area.

<sup>6</sup> Numbers may not add consistently due to rounding. Counts were rounded to the nearest hundred.

## Additions between 2004 and 2011

Table 2, together with the backward-looking Appendix B tables, provides a great deal of information on additions to the housing stock between 2004 and 2011.<sup>7</sup>

**Table 2: Sources for 2011 Memphis Housing Stock<sup>8</sup>**

2011 housing stock	552,500
2011 units present in 2004	481,700
<b>Total additions to stock</b>	<b>70,800</b>
Units added by new construction	65,400
House or mobile home moved in	3,100
Units added by conversion/merger	0
<b>New or reconstructed units</b>	<b>68,500</b>
Units added from nonresidential use	400
Units added from temporary losses	1,400
<b>Recovered units</b>	<b>1,800</b>
<b>Units added in other ways</b>	<b>600</b>

In the period between the 2004 and the 2011 AHS surveys, 70,800 units were added to the housing stock. Ninety-two percent of these additions were newly constructed units. The 2011 AHS did track move-ins of mobile homes in Memphis, a factor that contributed 3,100 units. No new units were formed from the conversion or merger of 2004 units.

We classified 1,800 units as recovered because these units had been in the housing stock at some point but were classified in 2004 as nonresidential (400) or uninhabitable (1,400). Finally, 600 units were added in other unclassified ways.

Appendix B contains four backward-looking tables that break the overall stock into more than 100 subgroups. For each subgroup, these tables detail how many of the 2011 units in that subgroup were in the same subgroup in 2011, have moved from another subgroup, or are new additions to the stock. Section 4 looks across the Appendix B backward-looking tables and focuses on those subgroups that gained an unusually high or an unusually low number of units over the 2004–2011 period.

### **4. Components With Atypical Losses or Additions**

The Memphis metropolitan area lost 2.3 percent of all 2004 housing units by 2011, but the loss rate varied across sectors of the stock. For example, the occupied housing stock lost 1.5 percent of its units between 2004 and 2011, a statistically significant difference.

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<sup>7</sup> With the caveats noted in Appendix A, this analysis applies to the area common to both the 2004 and 2011 definitions of the metropolitan area. Inconsistencies between Tables 1 and 2 result from a combination of (1) changes in metropolitan boundaries, (2) changes in control housing counts between censuses, and (3) different weights.

<sup>8</sup> Numbers may not add consistently due to rounding. Counts were rounded to the nearest hundred.

We examined all of the components of the 2004 Memphis housing stock contained in the four forward-looking tables in Appendix B to identify subgroups with unusual loss rates. Forward-Looking Table A reports information on all units in the stock; Table 3 lists subgroups from Table A with loss rates statistically different than the loss rate of the overall stock. Forward-Looking Tables B, C, and D describe important characteristics of occupied units and their residents; Table 3 lists subgroups from those tables with loss rates statistically different than the loss rate of occupied units. We also employed judgment in selecting among components with statistically different loss rates. In general, we looked for subgroups with loss rates less than half or more than double the benchmark rate, but we listed other subgroups if their inclusion illustrated interesting patterns within loss rates. Finally, Table 3 includes the loss rates for four key segments of the housing market—occupied units, vacant units, owner-occupied units, and renter-occupied units—even if their loss rates are not statistically different.

**Table 3: Sectors Experiencing Atypical Loss Rates in Memphis, 2004–2011<sup>9</sup>**

Characteristics	Present in 2004	Total lost	Percent lost
<i>Housing stock</i>	489,200	11,100	2.3%
<i>Occupancy status</i>			
Occupied	430,700	6,600	1.5%*
Vacant	57,300	4,300	7.6%***
<i>Units in structure</i>			
1, detached	334,600	4,300	1.3%***
2 to 4	34,700	3,000	8.6%***
5 to 9	43,400	2,200	5.0%*
<i>Year built</i>			
1995–1999	53,300	100	0.2%***
1990–1994	40,400	300	0.7%**
1980–1984	25,900	200	0.6%**
1950–1959	45,300	2,200	4.9%*
<i>Rooms</i>			
3	29,500	1,800	6.0%*
7	69,900	700	0.9%**
8	38,700	100	0.3%***
<i>Bedrooms</i>			
4 or more	95,700	1,200	1.3%*
<i>Multiunit structures</i>	120,600	0	5.2%***
<i>Stories in structures</i>			
2	81,900	4,700	5.8%***
<i>Lacking complete kitchen facilities</i>	9,400	800	8.6%*
<i>Severe problems</i>	6,500	700	11.4%*
<i>Moderate problems</i>	21,500	1,400	6.4%**
Kitchen	9,400	800	8.6%*
Upkeep	9,600	800	8.2%*
<i>Age of householder</i>			
65 to 74	39,000	100	0.3%***

<sup>9</sup> Two conditions were necessary for a housing sector to appear in Table 3, one mathematical and one judgmental: (1) the difference between the sector’s loss rate and the benchmark rate had to have been statistically significant at the 10-percent level, and (2) the difference had to be interesting. Counts are rounded to the nearest hundred.

<b>Characteristics</b>	<b>Present in 2004</b>	<b>Total lost</b>	<b>Percent lost</b>
<i>Race and ethnicity</i>		0	
White alone	257,500	1,600	0.6%***
White Non-Hispanic	245,900	1,200	0.5%****
Black	161,100	4,200	2.6%*
Black Non-Hispanic	159,200	4,200	2.6%*
<i>Tenure</i>			
Owner-occupied	287,500	1,700	0.6%***
Renter-occupied	143,200	4,900	3.4%**
<i>Renter monthly housing costs</i>			
Less than \$350	11,200	1,100	9.8%**
\$350 to \$599	41,800	2,000	4.8%**
<i>Renter household income</i>			
Less than \$15,000	36,100	2,100	5.8%**
<i>Owner monthly housing costs</i>			
\$600 to \$799	36,200	100	0.3%***
\$800 to \$1,249	71,500	100	0.1%***
\$1,250 or more	64,300	100	0.2%***
<i>Owner household income</i>			
\$30,000 to \$49,999	57,000	300	0.5%**
\$50,000 to \$99,999	109,000	100	0.1%***

\*Statistically different from either all units or all occupied units, as appropriate, at the 10-percent level.

\*\*Statistically different from either all units or all occupied units, as appropriate, at the 5-percent level.

\*\*\* Statistically different from either all units or all occupied units, as appropriate, at the 1-percent level.

The Memphis metropolitan area lost 2.3 percent of all 2004 housing units by 2011, but the loss rate varied across sectors of the stock. For example, the occupied housing stock lost 1.5 percent of its units between 2004 and 2011, a statistically significant difference.

Table 3 shows the following variation in loss rates across subgroups.

- Units occupied in 2004 had a loss rate that was lower and statistically different than the overall loss rate, while vacant units had a loss rate that was substantially higher and statistically different than the overall rate.
- The loss rate was lower among more recently built units and higher among older units.
- Single-family detached units had a lower-than-average loss rate, while units in small multifamily structures (2–4 units or 5–9 units) or 2-story multifamily structures had much higher loss rates.
- Smaller units (3 rooms) experienced high loss rates, whereas larger units (7 or 8 rooms or 4 or more bedrooms) had lower rates.
- Loss rates were high among units with severe or moderate physical problems in 2004.

- Units occupied in 2004 by households with White householders or householders between 65 and 74 years old had low loss rates, but units with Black householders had high loss rates.
- Units that were owner-occupied in 2004 experienced a low loss rate, but units that were renter-occupied had a high loss rate. Among 2004 rental units, those with low rents (less than \$600) and those occupied by low-income households (less than \$15,000) had high loss rates. Among owner-occupied units in 2004, household income and housing costs had a small impact on loss rates; as expected, higher income and higher housing costs were associated with lower loss rates.

The 70,800 additions reported in Table 2 represent 12.8 percent of the 2011 housing stock. The rate of addition varied by the characteristics of the housing. Additions represented 13.4 percent of occupied units.

We examined all of the components of the 2004 Memphis housing stock contained in the four backward-looking tables in Appendix B to identify subgroups with unusual addition rates. Backward-Looking Table A reports information on all units in the stock; Table 4 lists subgroups from Table A with addition rates statistically different than the addition rate of the overall stock. Backward-Looking Tables B, C, and D describe important characteristics of occupied units and their residents; Table 4 lists subgroups from those tables with addition rates statistically different than the addition rate of occupied units. We also employed judgment in selecting among components with statistically different addition rates. In general, we looked for subgroups with addition rates less than half or more than double the benchmark rate, but we listed other subgroups if their inclusion illustrated interesting patterns within addition rates. Finally, Table 4 includes the addition rates for four key segments of the housing market—occupied units, vacant units, owner-occupied units, and renter-occupied units—even if their addition rates are not statistically different.

**Table 4: Sectors Experiencing Atypical Rates of Addition in Memphis, 2004–2011<sup>10</sup>**

Characteristics	Present in 2011	Total additions	Percent additions
<i>Housing stock</i>	552,500	70,800	12.8%
<i>Occupancy status</i>			
Occupied	480,600	64,600	13.4%
Vacant	71,100	6,300	8.8% **
<i>Units in structure</i>			
2 to 4	30,500	700	2.2% ***
5 to 9	46,100	2,400	5.2% ***
10 to 19	29,400	2,200	7.5% **
<i>Rooms</i>			
2	3,300	1,300	39.4% **
4	79,800	5,800	7.3% ***
5	132,900	10,000	7.5% ***
8	50,100	9,900	19.8% ***
9	23,300	5,900	25.4% ***
10 or more	13,500	4,300	31.6% ***
<i>Bedrooms</i>			
2	122,000	6,800	5.6% **
4 or more	127,000	29,100	22.9% ***
<i>Multifamily units</i>	124,700	8,800	7.0% ***
<i>Stories in structure</i>			
1	22,000	1,200	5.3% ***
2	78,000	2,600	3.3% ***
4 to 6	2,700	1,800	64.9% ***
<i>Water</i>			
Well serving 1 to 5 units	19,600	4,600	23.7% **
<i>Sewer</i>			
Septic tank/cesspool	51,900	9,400	18.0% *
<i>Severe problems</i>	6,600	200	3.1% ***
Heating	4,000	200	5.0% *
<i>Moderate problems</i>			
Heating	4,700	200	4.3% **
Kitchen	9,400	600	6.8% *
<i>Race and ethnicity</i>			
White Hispanic	16,700	3,900	23.4% *
Asian alone	8,000	2,700	34.1% ***
Hispanic or Latino (any race)	21,500	4,500	21.0% *
<i>Tenure</i>			
Owner-occupied	313,300	46,300	14.8%
Renter-occupied	167,300	18,300	10.9% *

<sup>10</sup> Two conditions were necessary for a housing sector to appear in Table 4, one mathematical and one judgmental: (1) the difference between the sector's addition rate and the benchmark rate had to have been statistically significant at the 10-percent level, and (2) the difference had to be interesting. Counts are rounded to the nearest hundred.

Characteristics	Present in 2011	Total additions	Percent additions
<i>Renter monthly housing costs</i>			
\$600 to \$799	41,300	2,700	6.4% ***
\$800 to \$1,249	67,100	5,300	7.9% ***
\$1,250 or more	18,000	4,500	25.0% **
No cash rent	7,300	2,000	26.9% *
<i>Renter household income</i>			
Less than \$15,000	54,200	5,100	9.3% **
\$30,000 to \$49,999	31,600	1,800	5.6% ***
\$100,000 or more	9,600	2,800	28.8% **
<i>Owner housing costs</i>			
Less than \$350	20,400	900	4.5% ***
\$350 to \$599	46,000	3,500	7.7% ***
\$600 to \$799	32,300	2,200	6.7% ***
\$1,250 or more	129,600	29,300	22.6% ***
<i>Owner household income</i>			
\$15,000 to \$29,999	46,400	3,200	6.9% ***
\$30,000 to \$49,999	54,300	5,100	9.4% **
\$50,000 to \$99,999	99,900	19,300	19.3% ***
\$100,000 or more	77,800	15,200	19.5% ***

\*Statistically different from either all units or all occupied units, as appropriate, at the 10-percent level.

\*\*Statistically different from either all units or all occupied units, as appropriate, at the 5-percent level.

\*\*\* Statistically different from either all units or all occupied units, as appropriate, at the 1-percent level.

The results reported in Table 4 tell an interesting story about changes in the Memphis metropolitan area.

- Overall, units in multifamily structures experienced a low rate of addition, and this was particularly the case among units in small multifamily structures, measured in terms of either number of units in the structure or number of floors. Units in large multifamily buildings (4–6 floors) had a rate of addition that was substantially higher than the average.
- In general, small units (3–5 rooms or 2 bedrooms) had low rates of addition, while large units (8 or more rooms or 4 or more bedrooms) experienced a high rate. Units with only 2 rooms were an exception to this generalization.
- Rates of addition were high among units using wells and septic tanks.
- New additions to the stock were underrepresented among units in 2011 with severe physical problems and some types of moderate physical problems.
- Among units occupied in 2011 by households with Hispanic or Asian householders, the rates of addition were higher than average.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units but not statistically different. Among owner-occupied units, those occupied by lower income owners (\$15,000–\$49,999) and those with lower monthly



housing costs (less than \$800) had lower rates of addition, while those occupied by high-income owners (\$50,000 or more) and those with high monthly housing costs (\$1,250 or more) had higher-than-average rates of addition.

- The rate of addition was low among units that were renter-occupied in 2011 and, among rental units, particularly low for those occupied by households earning less than \$50,000 and those with low rents (\$600–\$1,249 per month). Units with no cash rent in 2011 were an exception, having a rate of addition almost twice that of all occupied units. Rates of addition were higher than normal among high-cost rentals (\$1,250 per month or more) and those occupied by households earning more than \$100,000.

## **5. Rental Market Dynamics: 2004–2011**

Rental market dynamics focuses on the supply of rental housing and how that supply changes over time. Rental dynamics analysis has many of the features of CINCH analysis. A key step in rental dynamics analysis is to separate the rental stock into classes or strata based on how affordable the units are. This paper uses eight categories:

- Non-market: Either no cash rent or a subsidized rent.
- Extremely low rent: Affordable to renters with incomes less than or equal to 30 percent of local area median income.
- Very low rent: Affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income.
- Low rent: Affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income.
- Moderate rent: Affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income.
- High rent: Affordable to renters with incomes greater than 80 percent but less than or equal to 100 percent of local area median income.
- Very high rent: Affordable to renters with incomes greater than 100 percent but less than or equal to 120 percent of local area median income.
- Extremely high rent: Affordable to renters with incomes greater than 120 percent of local area median income.

For each category, “affordable” is defined as a gross-rent-to-income ratio of 30 percent or less for the higher of the incomes that define the boundaries for that category.<sup>11</sup> The categories are

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<sup>11</sup> Gross rent is equal to rent plus utilities.

defined relative to area median income; therefore, the boundaries of the categories will change as area median income changes.

Table 5 summarizes what happened to the 2004 rental units by how affordable they were in 2004. It is based on Forward-Looking Rental Dynamics Table 1 in Appendix B, which traces in more detail where these units wound up in 2011.

**Table 5: Summary of Forward-Looking Rental Dynamics for Memphis**

Affordability categories	2004 rental units	To more affordable categories in 2011	In same affordability category in both years	To less affordable categories in 2011	2004 rental units non-rental in 2011
Non-market	33,400	NA	34.5%	49.3%	16.2%
Extremely low rent	14,200	3.0%	4.6%	59.5%	32.9%
Very low rent	75,200	5.2%	20.9%	53.8%	20.1%
Low rent	31,600	10.0%	11.6%	60.7%	17.7%
Moderate rent	19,300	19.7%	27.5%	29.1%	23.7%
High rent	900	18.3%	42.7%	22.0%	17.0%
Very high rent	2,800	63.5%	0.0%	0.0%	36.5%
Extremely high rent	1,400	49.1%	34.0%	NA	17.0%
Total	178,800	7.8%	21.1%	50.5%	20.6%

The 2004 rental stock in Memphis was affordable. Of the 178,800 rental units in 2004, 89,400 were extremely low rent or very low rent units. In addition, 33,400 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 68.7 percent of the 2004 rental stock. The three highest rent categories comprised only 3 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—50.5 percent of all 2004 units compared to 7.8 percent.

By 2011, 20.6 percent of the 178,800 rental units in 2004 were no longer in the rental stock (36,800 units). The largest proportion of these losses was due to changes in tenure, with 19,100 rental units becoming owner-occupied or vacant for sale in 2011. Another 10,000 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 7,800 rental units were no longer in the housing stock in 2011. Some of these losses were permanent; that is, the units were demolished or destroyed. Some losses were potentially reversible, such as units being used for nonresidential purposes. Forward-Looking Rental Dynamics Table 2 shows how the movement out of the rental stock varied across the affordability categories.

Table 6 summarizes where the 2011 rental units came from, with respect to 2004, by how affordable they were in 2011. It is based on Backward-Looking Rental Dynamics Table 1 in Appendix B, which traces in more detail the origin of these units.

The rental stock in Memphis was less affordable in 2011 than in 2004. Of the 205,000 rental units in 2011, 40,100 were extremely low rent or very low rent units. In addition, 25,600 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 32.0 percent of the 2011 rental stock. The three highest rent categories

comprised 16.2 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—43.7 percent of all 2011 units compared to 6.7 percent.

**Table 6: Summary of Backward-Looking Rental Dynamics for Memphis**

Affordability categories	2011 rental units	From more affordable categories in 2004	In same affordability category in both years	From less affordable categories in 2004	2011 rental units non-rental in 2004
Non-market	25,600	NA	44.0%	18.1%	37.9%
Extremely low rent	3,200	27.3%	18.6%	26.9%	27.3%
Very low rent	36,900	22.6%	42.2%	13.7%	21.5%
Low rent	34,800	64.2%	10.2%	3.3%	22.3%
Moderate rent	66,100	64.2%	8.4%	0.7%	26.8%
High rent	25,200	48.9%	1.5%	5.4%	44.2%
Very high rent	7,800	30.1%	0.0%	3.1%	66.8%
Extremely high rent	5,300	16.4%	9.1%	NA	74.4%
Total	205,000	43.7%	18.2%	6.7%	31.4%

Of the 205,000 rental units in 2011, 31.4 percent were not rental in 2004 (64,300 units). The largest proportion of these gains was due to changes in tenure, with 35,300 rental units having been owner-occupied or vacant for sale in 2004. Another 7,000 units had been seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 22,000 rental units had not been in the housing stock in 2004. Of these, 18,100 were added by new construction and 3,900 by other means. Backward-Looking Rental Dynamics Table 2 shows how the movement into the rental varied stock across the affordability categories.

## **6. Summary of Housing Market Changes: Memphis Metropolitan Area, 2004–2011**

In 2004 the Memphis metropolitan area contained 489,200 housing units, including vacant units. By 2011 the number of housing units had increased to 552,500. Part of this increase was due to a redefinition of the metropolitan area that added three Mississippi counties (Marshall, Tate, and Tunica). We estimate that the 2011 count of housing units for the metropolitan area as defined in 2004 would be 524,700. This represents an overall increase of 7.3 percent, which translates to an average annual increase of 1.0 percent over the 7-year period.

The change in the geographical definition of Memphis affects the interpretation of the information presented in this report. Our analysis applies only to that portion of the metropolitan area that was common to the Memphis metropolitan area as defined in both 2004 and 2011.

Between 2004 and 2011, only 11,100 units left the housing stock. Of these, 5,300 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 4,900 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 900 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations. Demolitions and natural

disasters accounted for 5,100 of the permanent losses, while mergers and conversions contributed another 200 permanent losses. Unfortunately, the 2011 AHS survey in Memphis did not track mobile home move-outs, probably because the long time between surveys makes it difficult to determine whether the current mobile home was the same mobile home as in 2004.

In the period between the 2004 and the 2011 AHS surveys, 70,800 units were added to the housing stock. Ninety-two percent of these additions were newly constructed units. The 2011 AHS did track move-ins of mobile homes in Memphis, a factor that contributed 3,100 units. No new units were formed from the conversion or merger of 2004 units. We classified 1,800 units as recovered because these units had been in the housing stock at some point but were classified in 2004 as nonresidential (400) or uninhabitable (1,400). Finally, 600 units were added in other unclassified ways.

Losses and additions varied across portions of the Memphis housing market defined by the characteristics of the unit or its occupants. We observed the following patterns, which were both atypical of the overall housing stock and statistically significant:

- Units occupied in 2004 had a loss rate that was lower and statistically different than the overall loss rate, while vacant units had a loss rate that was substantially higher and statistically different than the overall rate.
- The loss rate was lower among more recently built units and higher among older units.
- Single-family detached units had a lower-than-average loss rate, while units in small multifamily structures (2–4 units or 5–9 units) or 2-story multifamily structures had much higher loss rates.
- Smaller units (3 rooms) experienced high loss rates, whereas larger units (7 or 8 rooms or 4 or more bedrooms) had lower rates.
- Loss rates were high among units with severe or moderate physical problems in 2004.
- Units occupied in 2004 by households with White householders or householders between 65 and 74 years old had low loss rates, but units with Black householders had high loss rates.
- Units that were owner-occupied in 2004 experienced a low loss rate, but units that were renter-occupied had a high loss rate. Among 2004 rental units, those with low rents (less than \$600) and those occupied by low-income households (less than \$15,000) had high loss rates. Among owner-occupied units in 2004, household income and housing costs had a small impact on loss rates; as expected, higher income and higher housing costs were associated with lower loss rates.
- Overall, units in multifamily structures experienced a low rate of addition, and this was particularly the case among units in small multifamily structures, measured in terms of either number of units in the structure or number of floors. Units in large multifamily

buildings (4–6 floors) had a rate of addition that was substantially higher than the average.

- In general, small units (3–5 rooms or 2 bedrooms) had low rates of addition, while large units (8 or more rooms or 4 or more bedrooms) experienced a high rate. Units with only 2 rooms were an exception to this generalization.
- Rates of addition were high among units using wells and septic tanks.
- New additions to the stock were underrepresented among units in 2011 with severe physical problems and some types of moderate physical problems.
- Among units occupied in 2011 by households with Hispanic or Asian householders, the rates of addition were higher than average.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units but not statistically different. Among owner-occupied units, those occupied by lower income owners (\$15,000–\$49,999) and those with lower monthly housing costs (less than \$800) had lower rates of addition, while those occupied by high-income owners (\$50,000 or more) and those with high monthly housing costs (\$1,250 or more) had higher-than-average rates of addition.
- The rate of addition was low among units that were renter-occupied in 2011 and, among rental units, particularly low for those occupied by households earning less than \$50,000 and those with low rents (\$600–\$1,249 per month). Units with no cash rent in 2011 were an exception, having a rate of addition almost twice that of all occupied units. Rates of addition were higher than normal among high-cost rentals (\$1,250 per month or more) and those occupied by households earning more than \$100,000.

The 2004 rental stock in Memphis was affordable. Of the 178,800 rental units in 2004, 89,400 were extremely low rent or very low rent units. In addition, 33,400 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 68.7 percent of the 2004 rental stock. The three highest rent categories comprised only 3 percent of the rental stock. Moves by 2004 rental units to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—50.5 percent of all 2004 units compared to 7.8 percent. By 2011, 20.6 percent of the 178,800 rental units in 2004 were no longer in the rental stock (36,800 units). The largest proportion of these losses was due to changes in tenure, with 19,100 rental units becoming owner-occupied or vacant for sale in 2011.

The rental stock in Memphis was less affordable in 2011 than in 2004. Of the 205,000 rental units in 2011, 40,100 were extremely low rent or very low rent units. In addition, 25,600 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 32.0 percent of the 2011 rental stock. The three highest rent categories comprised 16.2 percent of the rental stock. Moves between 2004 and 2011 from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable

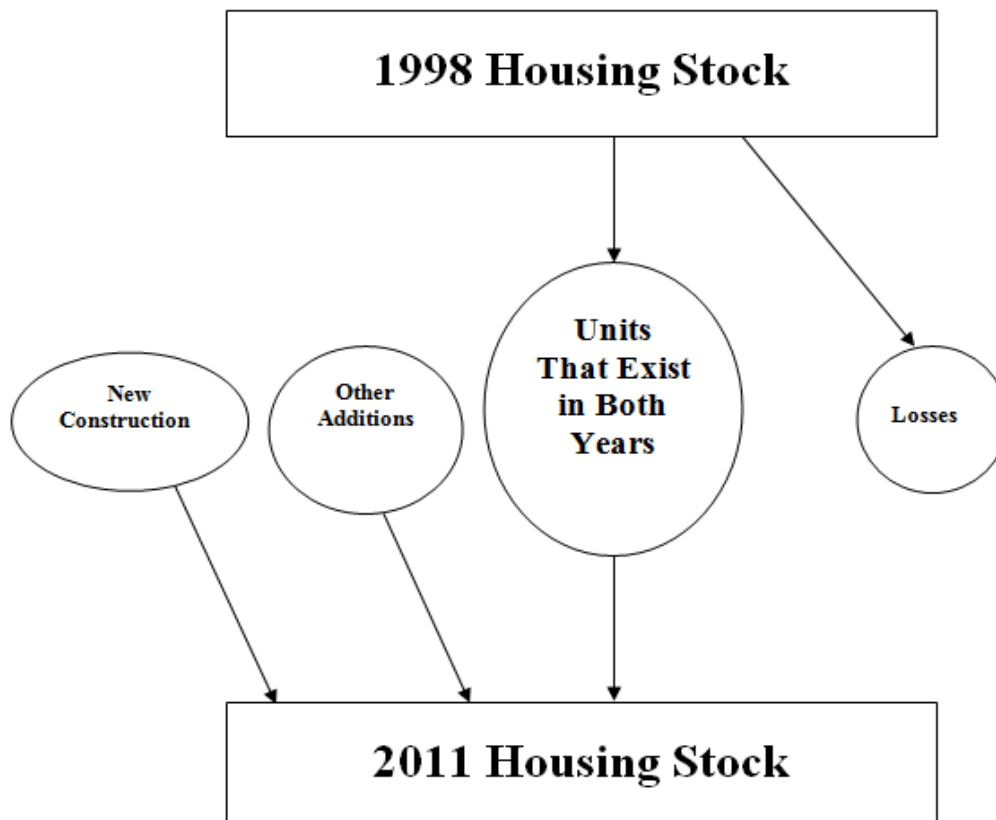
category (sometimes called filtration)—43.7 percent of all 2011 units compared to 6.7 percent. Of the 205,000 rental units in 2011, 31.4 percent were not rental in 2004 (64,300 units). The largest proportion of these gains was due to changes in tenure, with 35,300 rental units having been owner-occupied or vacant for sale in 2004.

## Appendix A: CINCH and Rental Dynamics 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 A-1: How the Housing Inventory Changes**



In the context of Figure A-1, the U.S. Census Bureau provides estimates for both rectangles (the 2004 and 2011 housing stocks) and one oval (units added through new construction between 2004 and 2011). No one estimates the other three ovals: the number of units that belong to both the 2004 and 2011 housing stock, units lost to the housing stock between 2004 and 2011, and other additions to the housing stock between 2004 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. 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:<sup>12</sup>

- To provide an estimate for all six components of Figure A-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.

Housing analysts and policymakers are particularly interested in what happens to affordable rental housing units. Rental dynamics is a form of CINCH analysis that classifies the rental housing stock by affordability level and tracks the evolution of the rental housing stock by affordability class.

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<sup>12</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 race of householder). This report uses this same distinction. Also adopting previous CINCH terminology, Appendix A will refer to the more recent AHS survey year, 2011, as the current year and the previous AHS survey year, 2004, as the base year.



## Why the analysis needs to be separated into two components

It would be possible to list for every AHS sample unit its status and characteristics in both 2004 and 2011. In some cases, there may be no status, (e.g., not yet constructed in 2004) 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 2004 and 2011.

The exact accounting would apply only to AHS sample observations, roughly a 1-in-500 picture of the housing stock at the metropolitan 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>13</sup> For example, the exact accounting might show that 2,500 sample units that were rental in 2004 became owner-occupied or vacant for sale in 2011. To estimate the number of units in the national housing stock that were rental in 2004 and became owner-occupied in 2011, one would need to apply weights. However, using 2004 weights would produce a different estimate than using 2011 weights. There is no conceptual reason to favor the answer using 2004 weights over the answer using 2011 weights. The choice of weights depends upon how the intended analysis will be used.

For this reason, previous CINCH analyses have distinguished between:

1. *Forward-looking analysis*; that is, starting with the base-year stock (2004) and determining the status and characteristics of *those* units in the current year (2011). The goal is to explain what happened to the 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.
2. *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 (2004). The goal here is to explain where the 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.

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<sup>13</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 survey because of stratification in drawing the sample. Generally, pure weights do not vary across survey years. 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 also vary between AHS surveys because of changes in the housing stock.

## Why changes in geography boundaries affect CINCH analysis

The analysis in this report applies only to that portion of the metropolitan area that was common to the metropolitan area as defined in both 2004 and 2011, and the application to the common area is not precise for the following reasons:

- For forward-looking analysis (2004 to 2011), we observe only those sample units in the geography common to both 2004 and 2011. Thus the observed changes correctly apply only to the common area. However, the forward-looking weights are based by necessity on the entire 2004 geography. Since the common area is smaller than the 2004 geography, the counts are overestimates for the common area.
- For the backward-looking analysis (2011 from 2004), we observe (a) sample units that were in the common area in 2004 and are still in the stock in 2011, (b) sample units representing additions to the stock throughout the metropolitan area as newly defined, and (c) sample units that represent housing existing in 2004 in the added portion of the metropolitan area. We can eliminate (c) and try to focus the analysis on the common area, but there are two problems. The backward-looking weights are based by necessity on the entire 2011 geography. Since the common area is smaller than the 2011 geography, the counts are overestimates for the common area. Moreover, we cannot determine which newly added sample units in (b) represent the common area and which represent the added portion of the metropolitan area. Therefore, additions are overestimated with respect to the common area.

## ***Appendix B: CINCH and Rental Dynamics Tables***

### **Contents**

This appendix contains 12 detailed CINCH and rental dynamics tables that have been featured in previous reports. There are:

- Four forward-looking CINCH tables that track changes to the 2004 housing stock in 2011 by various characteristics of the units or their occupants.
- Four backward-looking CINCH tables that track where the 2011 housing stock originated by various characteristics of the units or their occupants.
- Two forward-looking rental dynamics tables (one with counts and one with percentages) that track by affordability category what happened to the 2004 rental stock by 2011.
- Two backward-looking rental dynamics tables (one with counts and one with percentages) that track by affordability category where the 2011 rental stock came from with respect to 2004.

Appendix B begins with an explanation of how to read the 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. All counts are rounded to the nearest hundred.

The forward-looking tables report what happened to the 2004 housing stock by 2011. There are three possible dispositions of 2004 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 in 2011.

The backward-looking tables report where the 2011 housing stock came from in reference to 2004. There are three possible sources of 2011 units:

- Units that existed in 2004 with the same characteristics (or serving the same market).

- Units that existed in 2004 but with different characteristics (or serving a different market).
- Units that are additions to the housing stock between 2004 and 2011.

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 D 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, occupied units or units built from 1990 through 1994.
- Column B gives the CINCH estimate of the number of units that satisfy two conditions: (a) being part of the housing stock in the relevant year (2004 for the forward-looking tables and 2011 for the backward-looking tables) and (b) satisfying the condition in column A.
- Column C is the CINCH estimate of the number of units from column B 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.
- Column D is the CINCH estimate of the number of units from column B 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. 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 the forward-looking tables, columns E through J track what happened to units that were lost from 2004 to 2011.

- Column E is the CINCH estimate of the number of units from column B that are not in the 2011 housing stock because they were merged with other units or converted into multiple units.
- Column F is the CINCH estimate of the number of houses or manufactured homes from column B 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, manufactured houses that move from one lot to another are treated as both losses and additions.<sup>14</sup>

- Column G is the CINCH estimate of the number of units from column B that became nonresidential at the end of the period. For example, a real estate firm, a tax preparation office, a palm reader, or some other business might buy or rent a house to use for business rather than residential purposes.<sup>15</sup>
- Column H is the CINCH estimate of the number of units from column B that were demolished or were destroyed by fires or natural disasters by 2011.
- Column I is the CINCH estimate of the number of units from column B that in 2011 were condemned or were no longer usable for housing because of extensive damage.
- Column J is the CINCH estimate of the number of units from column B that were lost by 2011 for other reasons.

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

### ***Columns Unique to Backward-Looking Tables***

In backward-looking tables, columns E through J track where units came from that are part of the housing stock in 2011 but were not part of the 2004 housing stock.

- Column E is the CINCH estimate of the number of units from column B that were created by the merger or conversion of other units.
- Column F estimates the number of houses or mobile homes from column B that were moved in during the period. For many of the metropolitan areas in the 2011 AHS survey, information on movements was not collected.
- Column G is the CINCH estimate of the number of units from column B that had been nonresidential in 2004.
- Column H is the CINCH estimate of the number of units from column B that were newly constructed between 2004 and 2011. Note: Generally, in Backward-Looking Table A, there will be units in column H with year-built data substantially earlier than the survey year. There are three explanations for this apparent inconsistency. (1) With the exception of manufactured houses, presence in column H is determined by information from the

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<sup>14</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.

<sup>15</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.

Census Bureau indicating that the unit entered the sample from a listing of new construction; the Census Bureau may be mistaken. (2) Year built is based on information from the respondent; the respondent may be mistaken. (3) An older unit may have undergone substitution renovation that required a new construction permit, but the respondent may have given the original construction date rather than the renovation date. The extent of major renovation occurring in many established neighborhoods throughout the country makes (3) a likely possibility.

- Column I is the CINCH estimate of the number of units from column B that were added by 2011 from units that were structurally unsound in 2004.<sup>16</sup>
- Column J is the CINCH estimate of the number of units from column B that were added by 2011 from units that had been temporarily lost to the stock in 2004 for reasons “not classified” or were newly added by “other” means.

In some metropolitan areas, the AHS surveys do not report data for all the rows in the tables in this appendix. The columns for those rows are left blank.

## How to read rental dynamics tables

Forward-Looking Rental Dynamics Table 1 details by affordability category how the rental units in the 2004 housing stock relate to the 2011 housing stock. Column A estimates the number of units in each affordability category in 2004. Columns B through L explain where the 2004 rental units fit into the 2011 housing stock.

- If the units are still rental in 2011, they will be counted in columns B through I, depending upon how affordable they are in 2011.
- If the units have become owner-occupied or for vacant for sale, they will be counted in column J.
- Seasonal units, units that are not the primary residence of their occupants, units used for migratory workers, and units that are vacant but not for rent or sale are counted in column K.
- Column L counts 2004 units that are not in the 2011 housing stock; these can be either temporary or permanent losses to the stock.

The sum of columns B through L equals column A, except for rounding.

Forward-Looking Rental Dynamics Table 2 presents the same information as Table 1, but columns B through L are now percentages of column A. Columns B through L sum to 100 percent in each row.

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<sup>16</sup> These units had codes that identified them as “occupancy prohibited” or “interior exposed to the elements.”

Backward-Looking Rental Dynamics Table 1 details by affordability category where the rental units in the 2011 housing stock came from with respect to the 2004 housing stock. Column A estimates the number of units in each affordability category in 2011. Columns B through L explain where the 2011 rental units originated.

- If the units were rental in 2004, they will be counted in columns B through I, depending upon how affordable they are in 2004.
- If the units were owner-occupied or for vacant for sale, they will be counted in column J.
- Seasonal units, units that are not the primary residence of their occupants, units used for migratory workers, and units that are vacant but not for rent or sale in 2004 are counted in column K.
- Column L counts rental units that were newly constructed between 2004 and 2011.
- Column M counts rental units that were added to the housing stock after 2004 by other means.

The sum of columns B through M equals column A, except for rounding.

Backward-Looking Rental Dynamics Table 2 presents the same information as Table 1, but columns B through M are now percentages of column A. Columns B through M sum to 100 percent in each row.

These four Rental Dynamics Tables look only at the endpoints of the 7-year period; for example, a unit that is low rent in 2004 and moderate rent in 2011 might have been high rent, owned, or out of the stock at points in between the two surveys. These tables do not track the path of rental units between 2004 and 2011.

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

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
1	Housing stock	489,200	478,100	0	200	0	1,300	5,100	3,700	900	1
	Occupancy status										
2	Occupied	430,700	376,300	47,900	200	0	800	2,700	2,700	300	2
3	Vacant	57,300	15,600	37,400	0	0	500	2,400	800	600	3
4	Seasonal	1,200	0	1,100	0	0	0	0	100	0	4
	Units in structure										
5	1, detached	334,600	330,200	0	0	0	400	1,900	1,700	400	5
6	1, attached	17,500	17,100	0	0	0	0	300	200	0	6
7	2 to 4	34,700	31,700	0	200	0	700	1,100	900	200	7
8	5 to 9	43,400	41,300	0	0	0	0	1,200	600	300	8
9	10 to 19	28,200	27,600	0	0	0	0	500	200	0	9
10	20 to 49	7,200	6,700	0	0	0	200	200	200	0	10
11	50 or more	7,000	7,000	0	0	0	0	0	0	0	11
12	Manufactured/mobile home	16,500	16,500	0	0	0	0	0	0	0	12



	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
	Year built										
15	2000–2004	42,500	42,500	0	0	0	0	0	0	0	15
16	1995–1999	53,300	53,200	0	0	0	0	0	0	100	16
17	1990–1994	40,400	40,100	0	0	0	0	100	0	200	17
18	1985–1989	55,400	54,400	0	0	0	300	300	200	300	18
19	1980–1984	25,900	25,700	0	0	0	0	200	0	0	19
20	1975–1979	45,500	44,300	0	0	0	300	300	400	100	20
21	1970–1974	60,500	59,500	0	200	0	0	700	200	0	21
22	1960–1969	76,600	74,400	0	0	0	400	1,400	400	0	22
23	1950–1959	45,300	43,000	0	0	0	200	700	1,200	100	23
24	1940–1949	21,400	20,400	0	0	0	0	700	300	0	24
25	1930–1939	7,300	6,800	0	0	0	200	0	300	0	25
26	1920–1929	10,000	9,300	0	0	0	0	400	300	0	26
27	1919 or earlier	5,200	4,500	0	0	0	0	300	400	0	27
	Rooms										
28	1	1,900	1,100	700	0	0	0	200	0	0	28
29	2	4,300	800	3,500	0	0	0	0	0	0	29
30	3	29,500	19,200	8,600	0	0	0	1,500	200	200	30
31	4	82,400	47,900	31,300	200	0	500	1,100	1,100	300	31
32	5	106,800	62,300	41,800	0	0	400	1,400	800	100	32
33	6	119,800	63,800	54,000	0	0	300	600	900	300	33
34	7	69,900	33,400	35,900	0	0	0	300	400	0	34
35	8	38,700	17,000	21,600	0	0	0	100	0	0	35
36	9	19,700	7,500	12,000	0	0	100	0	100	0	36
37	10 or more	16,200	6,100	9,900	0	0	0	0	100	0	37

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
	Bedrooms										
38	None	3,200	1,800	1,300	0	0	0	200	0	0	38
39	1	40,900	31,100	8,000	0	0	0	1,500	200	200	39
40	2	118,800	95,400	19,000	200	0	700	1,700	1,300	500	40
41	3	230,600	193,700	33,300	0	0	400	1,600	1,200	300	41
42	4 or more	95,700	76,200	18,300	0	0	100	100	1,000	0	42
43	Multiunit structures	120,600	114,300	0	200	0	900	2,900	1,800	500	43
	Stories in structure										
44	1	18,000	16,800	0	200	0	0	700	300	0	44
45	2	81,900	77,200	0	0	0	700	2,200	1,300	500	45
46	3	15,200	14,800	0	0	0	200	0	200	0	46
47	4 to 6	1,900	1,900	0	0	0	0	0	0	0	47
48	7 or more	3,700	3,700	0	0	0	0	0	0	0	48

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

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
1	Occupied units	430,700	376,300	47,900	200	0	800	2,700	2,700	300	1
2	With complete kitchen	421,300	362,900	52,600	200	0	800	2,200	2,400	300	2
3	Lacking complete kitchen facilities	9,400	200	8,400	0	0	0	500	300	0	3
4	With complete plumbing	427,600	371,800	49,600	200	0	800	2,300	2,700	300	4
5	Lack some plumbing	3,100	200	2,600	0	0	0	300	0	0	5
6	No hot piped water	900	200	600	0	0	0	100	0	0	6
7	No bathtub/shower	300	200	0	0	0	0	100	0	0	7
8	No flush toilet	200	200	0	0	0	0	0	0	0	8
9	No exclusive use	2,200	0	2,000	0	0	0	200	0	0	9
	Water										
10	Public/private water	415,600	362,200	46,900	200	0	800	2,500	2,700	300	10
11	Well serving 1 to 5 units	14,500	13,100	1,300	0	0	0	100	0	0	11
12	Other water source	600	200	400	0	0	0	0	0	0	12
	Sewer										
13	Public sewer	383,000	330,600	46,200	200	0	800	2,500	2,500	300	13
14	Septic tank/cesspool	47,300	36,600	10,400	0	0	0	100	300	0	14
15	Other	400	200	200	0	0	0	0	0	0	15

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
16	Severe problems	6,500	200	5,600	0	0	0	500	300	0	16
17	Plumbing	3,100	200	2,600	0	0	0	300	0	0	17
18	Heating	2,400	0	2,100	0	0	0	200	200	0	18
19	Electric										19
20	Upkeep	1,000	0	900	0	0	0	0	100	0	20
21	Moderate problems	21,500	1,700	18,400	0	0	0	1,100	300	0	21
22	Plumbing	1,100	0	800	0	0	0	200	100	0	22
23	Heating	4,400	1,900	2,200	0	0	0	300	0	0	23
24	Kitchen	9,400	200	8,400	0	0	0	500	300	0	24
25	Upkeep	9,600	400	8,400	0	0	0	600	200	0	25

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

Row	A	B	C	D	E	F	G	H	I	J	Row
	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	
1	Occupied units	430,700	376,300	47,900	200	0	800	2,700	2,700	300	1
	Age of householder										
2	Under 65	360,000	279,900	74,200	200	0	800	2,400	2,500	100	2
3	65 to 74	39,000	9,300	29,600	0	0	0	0	100	0	3
4	75 or older	31,600	14,000	17,100	0	0	0	300	100	100	4
	Children in household										
5	Some	175,500	85,500	86,100	200	0	500	1,100	2,100	100	5
6	None	255,200	176,500	76,000	0	0	300	1,600	700	100	6
	Race and ethnicity										
7	White alone	257,500	203,000	52,800	0	0	400	600	500	100	7
8	Hispanic	11,600	4,300	6,900	0	0	0	400	0	0	8
9	Non-Hispanic	245,900	190,800	53,900	0	0	400	100	500	100	9
10	Black alone	161,100	119,300	37,600	200	0	200	1,800	2,100	0	10
11	Hispanic	1,800	200	1,600	0	0	0	0	0	0	11
12	Non-Hispanic	159,200	116,500	38,500	200	0	200	1,800	2,100	0	12
13	American Indian or Alaska Native alone	800	200	400	0	0	200	0	0	0	13
14	Asian alone	4,200	1,500	2,400	0	0	0	200	200	0	14
15	Pacific Islander alone	1,200	400	800	0	0	0	0	0	0	15
16	Two or more races	5,900	3,600	2,100	0	0	0	100	0	100	16
17	Hispanic or Latino (any race)	14,100	5,400	8,300	0	0	0	400	0	0	17

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J</b>	
<b>Row</b>	<b>Characteristics</b>	<b>Present in 2004</b>	<b>2004 units present in 2011</b>	<b>Change in characteristics</b>	<b>2004 units lost due to conversion/merger</b>	<b>2004 house or mobile home moved out</b>	<b>2004 units changed to nonresidential use</b>	<b>2004 units lost through demolition or disaster</b>	<b>2004 units badly damaged or condemned</b>	<b>2004 units lost in other ways</b>	<b>Row</b>
	Income sources of families and primary individuals										
18	Wages and salaries	354,900	249,100	100,800	200	0	600	2,100	2,000	100	18
20	Dividends, interest, or rent	128,400	41,500	86,400	0	0	100	300	100	0	20
21	Public assistance or public welfare	11,900	1,600	9,800	0	0	100	200	300	0	21

**Forward-Looking Table D: Income and Housing Cost, Memphis**

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
1	Occupied units	430,700	376,300	47,900	200	0	800	2,700	2,700	300	1
	Tenure										
2	Owner-occupied	287,500	237,200	48,600	0	0	100	500	800	300	2
3	Homeownership rate	66.8%									3
4	Renter-occupied	143,200	96,100	42,100	200	0	600	2,100	2,000	0	4
	Renter monthly housing costs										
5	No cash rent	6,900	1,200	5,400	0	0	0	300	0	0	5
6	Less than \$350	11,200	3,300	6,800	0	0	0	500	600	0	6
7	\$350 to \$599	41,800	9,600	30,200	200	0	300	900	600	0	7
8	\$600 to \$799	48,500	12,800	34,600	0	0	100	300	600	0	8
9	\$800 to \$1,249	29,300	12,700	16,200	0	0	200	100	200	0	9
10	\$1,250 or more	5,500	1,900	3,600	0	0	0	0	0	0	10
	Renter household income										
11	Less than \$15,000	36,100	13,600	20,500	200	0	200	1,100	600	0	11
12	\$15,000 to \$29,999	42,100	10,300	30,300	0	0	200	500	900	0	12
13	\$30,000 to \$49,999	34,000	4,500	28,600	0	0	300	400	200	0	13
14	\$50,000 to \$99,999	27,000	5,600	21,000	0	0	0	100	300	0	14
15	\$100,000 or more	4,000	500	3,600	0	0	0	0	0	0	15

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2004	2004 units present in 2011	Change in characteristics	2004 units lost due to conversion/merger	2004 house or mobile home moved out	2004 units changed to nonresidential use	2004 units lost through demolition or disaster	2004 units badly damaged or condemned	2004 units lost in other ways	Row
	Owner monthly housing costs										
16	Less than \$350	63,400	12,100	50,400	0	0	0	300	600	0	16
17	\$350 to \$599	52,100	10,800	40,900	0	0	0	300	0	100	17
18	\$600 to \$799	36,200	6,800	29,300	0	0	0	0	100	0	18
19	\$800 to \$1,249	71,500	23,100	48,300	0	0	0	0	0	100	19
20	\$1,250 or more	64,300	45,900	18,400	0	0	100	0	0	0	20
	Owner household income										
21	Less than \$15,000	26,900	7,400	18,800	0	0	0	100	500	100	21
22	\$15,000 to \$29,999	35,300	8,700	26,300	0	0	100	100	100	0	22
23	\$30,000 to \$49,999	57,000	14,000	42,600	0	0	0	100	100	100	23
24	\$50,000 to \$99,999	109,000	38,900	69,900	0	0	0	100	0	0	24
25	\$100,000 or more	59,300	28,100	31,100	0	0	0	0	0	0	25



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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
1	Housing stock	552,500	481,700	0	0	3,100	400	65,400	1,400	600	1
	Occupancy status										
2	Occupied	480,600	379,200	36,900	0	2,400	200	60,200	1,300	600	2
3	Vacant	71,100	15,600	49,200	0	700	200	5,200	200	0	3
4	Seasonal	800	0	800	0	0	0	0	0	0	4
	Units in structure										
5	1, detached	384,900	331,400	0	0	0	200	52,700	300	400	5
6	1, attached	20,400	16,400	0	0	0	0	4,100	0	0	6
7	2 to 4	30,500	29,800	0	0	0	0	700	0	0	7
8	5 to 9	46,100	43,700	0	0	0	0	2,000	400	0	8
9	10 to 19	29,400	27,200	0	0	0	0	2,000	0	200	9
10	20 to 49	9,700	7,500	0	0	0	200	2,000	0	0	10
11	50 or more	9,100	7,800	0	0	0	0	1,300	0	0	11
12	Manufactured/mobile home	22,400	17,900	0	0	3,100	0	700	700	0	12

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
	Year built										
13	2010–2014	3,900	0	0	0	0	0	3,900	0	0	13
14	2005–2009	45,400	0	0	0	0	0	45,400	0	0	14
15	2000–2004	58,300	42,900	0	0	300	200	14,900	0	0	15
16	1995–1999	55,100	54,100	0	0	0	0	1,000	0	0	16
17	1990–1994	42,100	40,700	0	0	1,400	0	0	0	0	17
18	1985–1989	56,300	55,300	0	0	700	0	200	200	0	18
19	1980–1984	27,200	26,500	0	0	0	0	0	700	0	19
20	1975–1979	44,500	43,600	0	0	700	0	0	200	0	20
21	1970–1974	60,800	60,200	0	0	0	0	0	200	400	21
22	1960–1969	75,200	75,000	0	0	0	0	0	200	0	22
23	1950–1959	43,300	43,300	0	0	0	0	0	0	0	23
24	1940–1949	20,400	20,300	0	0	0	200	0	0	0	24
25	1930–1939	6,600	6,600	0	0	0	0	0	0	0	25
26	1920–1929	9,200	9,200	0	0	0	0	0	0	0	26
27	1919 or earlier	4,300	4,200	0	0	0	0	0	0	200	27

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
	Rooms										
28	1	2,100	1,200	900	0	0	0	0	0	0	28
29	2	3,300	900	1,100	0	700	400	200	0	0	29
30	3	32,200	18,700	9,900	0	700	0	2,700	0	200	30
31	4	79,800	48,500	25,500	0	700	0	4,600	400	200	31
32	5	132,900	63,200	59,700	0	300	0	9,500	200	0	32
33	6	130,100	64,700	48,400	0	700	0	15,400	700	200	33
34	7	85,200	33,700	38,500	0	0	0	12,800	200	0	34
35	8	50,100	17,200	23,000	0	0	0	9,900	0	0	35
36	9	23,300	7,600	9,800	0	0	0	5,900	0	0	36
37	10 or more	13,500	6,200	3,100	0	0	0	4,300	0	0	37
	Bedrooms										
38	None	4,000	2,000	1,000	0	700	0	200	0	0	38
39	1	43,800	30,800	7,400	0	1,400	400	3,500	0	400	39
40	2	122,000	95,000	20,200	0	0	0	6,500	400	0	40
41	3	255,800	197,700	29,700	0	1,000	0	26,300	900	200	41
42	4 or more	127,000	77,000	20,800	0	0	0	28,900	200	0	42
43	Multiunit structures	124,700	116,000	0	0	0	200	8,000	400	200	43
	Stories in structure										
44	1	22,000	20,900	0	0	0	200	1,000	0	0	44
45	2	78,000	75,400	0	0	0	0	2,200	400	0	45
46	3	16,700	13,500	0	0	0	0	3,000	0	200	46
47	4 to 6	2,700	1,000	0	0	0	0	1,800	0	0	47
48	7 or more	5,300	5,300	0	0	0	0	0	0	0	48

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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
1	Occupied units	480,600	379,200	36,900	0	2,400	200	60,200	1,300	600	1
2	With complete kitchen	471,200	365,900	41,900	0	2,100	200	59,500	1,100	600	2
3	Lacking complete kitchen facilities	9,400	200	8,000	0	300	0	700	200	0	3
4	With complete plumbing	478,300	374,700	39,000	0	2,400	200	60,200	1,300	600	4
5	Lack some plumbing	2,300	200	2,100	0	0	0	0	0	0	5
6	No hot piped water	600	200	400	0	0	0	0	0	0	6
7	No bathtub/shower	200	200	0	0	0	0	0	0	0	7
8	No flush toilet	200	200	0	0	0	0	0	0	0	8
9	No exclusive use	1,700	0	1,700	0	0	0	0	0	0	9
	Water										
10	Public/private water	460,800	364,800	36,000	0	2,100	200	55,800	1,300	600	10
11	Well serving 1 to 5 units	19,600	13,400	1,600	0	300	0	4,300	0	0	11
12	Other water source	200	200	0	0	0	0	0	0	0	12
	Sewer										
13	Public sewer	428,500	332,800	40,500	0	2,100	200	51,800	600	600	13
14	Septic tank/cesspool	51,900	37,200	5,400	0	300	0	8,400	700	0	14
15	Other	200	200	0	0	0	0	0	0	0	15

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
16	Severe problems	6,600	200	6,200	0	0	0	200	0	0	16
17	Plumbing	2,300	200	2,100	0	0	0	0	0	0	17
18	Heating	4,000	0	3,800	0	0	0	200	0	0	18
19	Electric										19
20	Upkeep	400	0	400	0	0	0	0	0	0	20
21	Moderate problems	23,100	2,000	18,900	0	300	0	1,700	200	0	21
22	Plumbing	2,400	0	2,000	0	0	0	400	0	0	22
23	Heating	4,700	1,900	2,600	0	0	0	200	0	0	23
24	Kitchen	9,400	200	8,000	0	300	0	700	200	0	24
25	Upkeep	9,400	400	8,400	0	0	0	600	0	0	25

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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
1	Occupied units	480,600	379,200	36,900	0	2,400	200	60,200	1,300	600	1
	Age of householder										
2	Under 65	392,700	282,200	53,000	0	1,700	200	53,900	1,300	400	2
3	65 to 74	49,000	8,900	36,500	0	700	0	2,700	0	200	3
4	75 or older	38,800	14,500	20,800	0	0	0	3,500	0	0	4
	Children in household										
5	Some	174,400	86,600	60,100	0	0	0	27,300	400	0	5
6	None	306,200	177,700	91,700	0	2,400	200	32,900	900	600	6
	Race and ethnicity										
7	White alone	272,700	204,500	30,700	0	2,100	0	34,100	1,100	200	7
8	Hispanic	16,700	4,200	8,600	0	1,400	0	2,300	200	0	8
9	Non-Hispanic	256,000	192,500	30,000	0	700	0	31,800	900	200	9
10	Black alone	192,000	120,700	47,900	0	300	200	22,400	200	400	10
11	Hispanic	4,800	200	4,000	0	0	0	600	0	0	11
12	Non-Hispanic	187,200	117,900	46,400	0	300	200	21,800	200	400	12
13	American Indian or Alaska Native alone	1,500	200	1,300	0	0	0	0	0	0	13
14	Asian alone	8,000	1,500	3,800	0	0	0	2,700	0	0	14
15	Pacific Islander alone	600	400	200	0	0	0	0	0	0	15
16	Two or more races	5,700	3,200	1,600	0	0	0	900	0	0	16
17	Hispanic or Latino (any race)	21,500	5,400	11,600	0	1,400	0	2,900	200	0	17

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
	Income sources of families and primary individuals										
18	Wages and salaries	354,100	252,000	49,300	0	2,400	200	48,600	1,300	400	18
20	Dividends, interest, or rent	90,600	42,100	34,200	0	300	0	14,000	0	0	20
21	Public assistance or public welfare	15,700	1,500	11,800	0	0	0	2,000	400	0	21

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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
1	Occupied units	480,600	379,200	36,900	0	2,400	200	60,200	1,300	600	1
	Tenure										
2	Owner-occupied	313,300	240,800	26,200	0	1,000	0	45,100	200	0	2
3	Homeownership rate	65.2%									3
4	Renter-occupied	167,300	94,700	54,300	0	1,400	200	15,000	1,100	600	4
	Renter monthly housing costs										
5	No cash rent	7,300	1,200	4,200	0	700	0	400	700	200	5
6	Less than \$350	7,900	3,200	3,800	0	0	0	900	0	0	6
7	\$350 to \$599	25,700	9,200	13,600	0	700	0	1,800	0	400	7
8	\$600 to \$799	41,300	12,500	26,100	0	0	200	2,300	200	0	8
9	\$800 to \$1,249	67,100	12,400	49,400	0	0	0	5,100	200	0	9
10	\$1,250 or more	18,000	2,000	11,500	0	0	0	4,500	0	0	10
	Renter household income										
11	Less than \$15,000	54,200	13,300	35,800	0	0	200	3,800	900	200	11
12	\$15,000 to \$29,999	44,900	10,400	29,400	0	700	0	4,300	0	200	12
13	\$30,000 to \$49,999	31,600	4,500	25,400	0	0	0	1,800	0	0	13
14	\$50,000 to \$99,999	26,900	5,500	17,900	0	0	0	3,100	200	200	14
15	\$100,000 or more	9,600	500	6,400	0	700	0	2,100	0	0	15



	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2004	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 2004 stock	2011 units added in other ways	Row
	Owner monthly housing costs										
16	Less than \$350	20,400	12,200	7,200	0	300	0	500	200	0	16
17	\$350 to \$599	46,000	11,200	31,300	0	700	0	2,900	0	0	17
18	\$600 to \$799	32,300	7,000	23,200	0	0	0	2,200	0	0	18
19	\$800 to \$1,249	85,100	23,500	51,200	0	0	0	10,400	0	0	19
20	\$1,250 or more	129,600	46,500	53,800	0	0	0	29,300	0	0	20
	Owner household income										
21	Less than \$15,000	34,900	7,700	23,600	0	0	0	3,500	0	0	21
22	\$15,000 to \$29,999	46,400	9,500	33,700	0	300	0	2,900	0	0	22
23	\$30,000 to \$49,999	54,300	13,600	35,600	0	0	0	5,100	0	0	23
24	\$50,000 to \$99,999	99,900	39,200	41,400	0	700	0	18,400	200	0	24
25	\$100,000 or more	77,800	28,500	34,100	0	0	0	15,200	0	0	25

**Forward-Looking Rental Dynamics Table 1: Counts, 2004–2011, Memphis**

Affordability categories	A Total in 2004	B Non-market in 2011	C Extremely low rent in 2011	D Very low rent in 2011	E Low rent in 2011	F Moderate rent in 2011	G High rent in 2011	H Very high rent in 2011	I Extremely high rent in 2011	J Owner- occupied in 2011	K Seasonal or related vacant in 2011	L Lost to stock in 2011
Non-market	33,400	11,500	900	4,000	4,400	6,100	700	200	200	2,800	1,600	1,100
Extremely low rent	14,200	400	700	4,500	1,300	2,200	500	0	0	1,100	1,500	2,100
Very low rent	75,200	3,400	500	15,700	16,900	20,400	2,800	200	200	7,600	4,300	3,200
Low rent	31,600	400	0	2,700	3,700	14,400	4,000	700	0	3,800	1,100	700
Moderate rent	19,300	200	500	1,900	1,200	5,300	4,200	1,200	200	2,600	1,500	500
High rent	900	0	0	0	0	200	400	0	200	0	0	200
Very high rent	2,800	200	0	200	0	200	1,100	0	0	1,000	0	0
Extremely high rent	1,400	0	0	200	0	0	200	200	500	200	0	0
Total	178,800	16,100	2,600	29,200	27,500	48,800	13,900	2,500	1,300	19,100	10,000	7,800

**Forward-Looking Rental Dynamics Table 2: Row Percentages, 2004–2011, Memphis**

Affordability categories	A Total in 2004	B Non-market in 2011	C Extremely low rent in 2011	D Very low rent in 2011	E Low rent in 2011	F Moderate rent in 2011	G High rent in 2011	H Very high rent in 2011	I Extremely high rent in 2011	J Owner- occupied in 2011	K Seasonal or related vacant in 2011	L Lost to stock in 2011
Non-market	33,400	34.5%	2.7%	11.9%	13.0%	18.2%	2.0%	0.7%	0.7%	8.2%	4.7%	3.3%
Extremely low rent	14,200	3.0%	4.6%	31.9%	8.8%	15.4%	3.4%	0.0%	0.0%	7.4%	10.8%	14.7%
Very low rent	75,200	4.6%	0.7%	20.9%	22.5%	27.1%	3.7%	0.3%	0.3%	10.2%	5.7%	4.3%
Low rent	31,600	1.4%	0.0%	8.6%	11.6%	45.7%	12.7%	2.3%	0.0%	12.1%	3.4%	2.2%
Moderate rent	19,300	1.2%	2.4%	9.8%	6.4%	27.5%	21.6%	6.5%	1.0%	13.7%	7.5%	2.5%
High rent	900	0.0%	0.0%	0.0%	0.0%	18.3%	42.7%	0.0%	22.0%	0.0%	0.0%	17.0%
Very high rent	2,800	7.1%	0.0%	8.2%	0.0%	8.2%	40.0%	0.0%	0.0%	36.5%	0.0%	0.0%
Extremely high rent	1,400	0.0%	0.0%	17.5%	0.0%	0.0%	14.6%	17.0%	34.0%	17.0%	0.0%	0.0%
Total	178,800	9.1%	1.4%	16.4%	15.3%	27.3%	7.7%	1.5%	0.7%	10.7%	5.5%	4.3%

**Backward-Looking Rental Dynamics Table 1: Counts, 2004–2011, Memphis**

Affordability categories	A Total in 2011	B Non- market in 2004	C Extremely low rent in 2004	D Very low rent in 2004	E Low rent in 2004	F Moderate rent in 2004	G High rent in 2004	H Very high rent in 2004	I Extremely high rent in 2004	J Owner- occupied in 2004	K Seasonal or related vacant in 2004	L New construction	M Added in other ways
Non-market	25,600	11,200	400	3,300	400	200	0	200	0	4,100	600	3,300	1,800
Extremely low rent	3,200	900	600	500	0	400	0	0	0	200	0	500	200
Very low rent	36,900	4,000	4,400	15,600	2,800	1,800	0	200	200	4,200	1,900	1,000	900
Low rent	34,800	4,400	1,300	16,700	3,600	1,100	0	0	0	4,400	1,700	1,300	400
Moderate rent	66,100	6,100	2,400	19,700	14,200	5,500	200	200	0	11,700	2,100	3,900	0
High rent	25,200	700	500	2,800	4,000	4,300	400	1,200	200	6,500	400	3,500	700
Very high rent	7,800	200	0	200	700	1,200	0	0	200	3,100	200	1,900	0
Extremely high rent	5,300	200	0	200	0	200	200	0	500	1,200	0	2,800	0
Total	205,000	27,700	9,600	59,000	25,700	14,900	800	1,800	1,200	35,300	7,000	18,100	3,900

**Backward-Looking Rental Dynamics Table 2: Row Percentages, 2004–2011, Memphis**

Affordability categories	A Total in 2011	B Non- market in 2004	C Extremely low rent in 2004	D Very low rent in 2004	E Low rent in 2004	F Moderate rent in 2004	G High rent in 2004	H Very high rent in 2004	I Extremely high rent in 2004	J Owner- occupied in 2004	K Seasonal or related vacant in 2004	L New construction	M Added in other ways
Non-market	25,600	44.0%	1.7%	13.0%	1.7%	0.9%	0.0%	0.8%	0.0%	15.9%	2.4%	12.8%	6.9%
Extremely low rent	3,200	27.3%	18.6%	14.3%	0.0%	12.6%	0.0%	0.0%	0.0%	7.6%	0.0%	14.2%	5.5%
Very low rent	36,900	10.7%	11.9%	42.2%	7.5%	4.9%	0.0%	0.6%	0.7%	11.4%	5.0%	2.7%	2.5%
Low rent	34,800	12.6%	3.6%	48.0%	10.2%	3.3%	0.0%	0.0%	0.0%	12.5%	5.0%	3.7%	1.1%
Moderate rent	66,100	9.2%	3.7%	29.8%	21.5%	8.4%	0.3%	0.4%	0.0%	17.7%	3.2%	5.9%	0.0%
High rent	25,200	2.7%	1.9%	11.1%	16.1%	17.2%	1.5%	4.6%	0.8%	25.8%	1.7%	13.8%	2.9%
Very high rent	7,800	3.1%	0.0%	2.5%	8.7%	15.9%	0.0%	0.0%	3.1%	40.0%	2.6%	24.3%	0.0%
Extremely high rent	5,300	4.7%	0.0%	4.5%	0.0%	3.6%	3.6%	0.0%	9.1%	21.8%	0.0%	52.6%	0.0%
Total	205,000	13.5%	4.7%	28.8%	12.5%	7.3%	0.4%	0.9%	0.6%	17.2%	3.4%	8.8%	1.9%