

# **American Housing Survey**

## **Components of Inventory Change and Rental Dynamics Analysis: Dallas, 2002–2011**

*Prepared For:*

**U.S. Department of Housing & Urban Development  
Office of Policy Development & Research**

*Prepared By:*

**Frederick J. Eggers & Fouad Moumen  
Econometrica, Inc.  
Bethesda, MD**

**Contract No. C-CHI-01030  
Order No. CHI-T0002  
Project No. 1053-002**

**May 2015**

# Table of Contents

**Executive Summary ..... iv**

**1. Introduction ..... 1**

**2. Special Issues: Dallas ..... 2**

**3. Changes to the Housing Stock: 2002–2011 ..... 3**

**4. Components With Atypical Losses or Additions ..... 5**

**5. Rental Market Dynamics: 2002–2011 ..... 11**

**6. Summary of Housing Market Changes: Dallas Metropolitan Area, 2002–2011 14**

**Appendix A: CINCH and Rental Dynamics Methodology ..... A-1**

**Appendix B: CINCH and Rental Dynamics Tables ..... B-1**

## List of Tables

Table 1: Disposition of 2002 Dallas Housing Units in 2011 .....	4
Table 2: Sources for 2011 Dallas Housing Stock .....	5
Table 3: Sectors Experiencing Atypical Loss Rates in Dallas, 2002–2011 .....	7
Table 4: Sectors Experiencing Atypical Rates of Addition in Dallas, 2002–2011 .....	9
Table 5: Summary of Forward-Looking Rental Dynamics for Dallas .....	12
Table 6: Summary of Backward-Looking Rental Dynamics for Dallas .....	13
Forward-Looking Table A: Housing Characteristics, Dallas .....	B-6
Forward-Looking Table B: Unit Quality, Dallas .....	B-9
Forward-Looking Table C: Occupant Characteristics, Dallas .....	B-11
Forward-Looking Table D: Income and Housing Cost, Dallas .....	B-13
Backward-Looking Table A: Housing Characteristics, Dallas .....	B-15
Backward-Looking Table B: Unit Quality, Dallas .....	B-18
Backward-Looking Table C: Occupant Characteristics, Dallas .....	B-20
Backward-Looking Table D: Income and Housing Cost, Dallas .....	B-22
Forward-Looking Rental Dynamics Table 1: Counts, 2002–2011, Dallas (All Numbers in Thousands) .....	B-24
Forward-Looking Rental Dynamics Table 2: Row Percentages, 2002–2011, Dallas .....	B-24
Backward-Looking Rental Dynamics Table 1: Counts, 2002–2011, Dallas (All Numbers in Thousands) .....	B-25
Backward-Looking Rental Dynamics Table 2: Row Percentages, 2002–2011, Dallas .....	B-25

## List of Figures

Figure A-1: How the Housing Inventory Changes .....	A-1
---	-----

## ***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 Dallas metropolitan area changed between 2002 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 Dallas and on their occupants in both 2002 and 2011.

In 2002 the Dallas metropolitan area contained 1,365,600 housing units, including vacant units. By 2011 the number of housing units had increased to 1,691,000. Part of this increase was due to a redefinition of the metropolitan area that added Delta and Hunt Counties. We estimate that the 2011 count of housing units for the metropolitan area as defined in 2002 would be 1,653,900. This represents an overall increase of 21.1 percent, which translates to an average annual increase of 2.2 percent over the 9-year period.

Between 2002 and 2011, 22,400 units left the housing stock. Of these, 16,400 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 4,100 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 1,900 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations.

In the period between the 2002 and the 2011 AHS surveys, 283,400 units were added to the housing stock. Ninety-seven percent of these additions were newly constructed units. The 2011 AHS did track move-ins of mobile homes in Dallas, a factor that contributed 4,300 units. No units were formed from the conversion or merger of 2002 units. We classified 3,900 units as recovered because these units had been in the housing stock at some point but were classified in 2002 as nonresidential (2,900) or uninhabitable (1,000). Finally, 500 units were added in other unclassified ways.

The Dallas metropolitan area lost 1.6 percent of all 2002 housing units by 2011; additions between 2002 and 2011 represented 16.8 percent of the 2011 housing stock. Losses and additions varied across portions of the Dallas 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:

- Among units that were vacant in 2002, the loss rate was much higher.
- Single-family detached units had a lower-than-average loss rate, as did recently built units (1980–1989 and 1995–2002). Units in multifamily structures had high loss rates.

- Small units (4 rooms or 0 or 2 bedrooms) had high loss rates, while large units (7 rooms or 3 or more bedrooms) had low loss rates.
- Units occupied in 2002 by households with Hispanic householders had a higher-than-average loss rate.
- Units that were owner-occupied in 2002 experienced a low loss rate, but units that were renter-occupied had a high loss rate.
- Among 2002 rental units, those with low rents (\$350–\$599) and those occupied by low-income households (\$15,000–\$29,999) had high loss rates.
- Among owner-occupied units, those occupied in 2002 by higher income households (\$50,000 or more) and those with high monthly housing costs (\$1,250 or more) had very low loss rates.
- The rate of addition was high among both single-family detached and single-family attached units.
- Overall, units in multifamily structures experienced a low rate of addition, and this was particularly the case among units in small multifamily structures (2–4 units, 5–9 units, 10–19 units, 2 stories). However, units in large multifamily buildings (50 or more units or 4–6 floors) had high rates of addition.
- The rate of addition varied directly with unit size, with smaller units having lower rates and larger units having higher rates. This was true when measuring size either by number of rooms or number of bedrooms.
- New additions to the stock were underrepresented among units in 2011 with quality problems, specifically severe physical problems, lacking complete plumbing, lacking complete kitchen facilities, or moderate heating problems.
- Units with older (65 years or older) householders in 2011 had low rates of addition, whereas those with children had a higher-than-average rate.
- Units with Hispanic or White householders in 2011 had low rates of addition, whereas those with Black or Asian householders had higher-than-average rates.
- The rate of addition was low among units that were renter-occupied in 2011, and the rate of addition varied with both monthly housing costs and household income in 2011. Rental units with housing costs of \$1,250 or more or with households earning \$100,000 or more had high rates of addition. Most of the other housing cost and household income categories among renters had rates of addition that were statistically different and lower than the rate for all occupied units.

- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units but not statistically different. As with the rental stock, the rate of addition among the owner subgroups varied with both monthly housing costs and household income in 2011. Owner-occupied units with housing costs of \$1,250 or more or with households earning \$50,000 or more had high rates of addition. Most of the other housing cost and household income categories among owners had rates of addition that were statistically different and lower than the rate for all occupied units.

The 2002 rental stock in Dallas was affordable. Of the 537,200 rental units in 2002, 292,700 were extremely low rent or very low rent units. In addition, 79,300 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 69.2 percent of the 2002 rental stock. The three highest rent categories comprised only 3.7 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—49.5 percent of all 2002 units compared to 7.2 percent. By 2011, 13.1 percent rental units in 2002 were no longer in the rental stock. The largest proportion of these losses was due to changes in tenure.

The rental stock in Dallas was less affordable in 2011 than in 2002. Of the 683,900 rental units in 2011, 168,100 were extremely low rent or very low rent units. In addition, 56,800 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 32.9 percent of the 2011 rental stock. The three highest rent categories comprised 16.3 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—40.8 percent of all 2011 units compared to 6.1 percent. Of the rental units in 2011, 27.9 percent were not rental in 2002; changes in tenure and new construction account for most of the new rental units.

# Components of Inventory Change and Rental Dynamics Analysis: Dallas, 2002–2011

## 1. Introduction

This report describes how the housing stock in the Dallas metropolitan area changed between 2002 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 Dallas and on their occupants in both 2002 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 2002 units by 2011) and backward-looking analysis (where the 2011 units came from in terms of 2002).<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 Dallas.
- Section 3 explains the changes in the housing stock between 2002 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 2002 and 2011.

---

<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 Dallas metropolitan area between 2002 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 2002–2011 period encompassed 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: Dallas**

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 2002 the Dallas metropolitan area contained 1,365,600 housing units, including vacant units. By 2011 the number of housing units had increased to 1,691,000. Part of this increase was due to a redefinition of the metropolitan area that added Delta and Hunt Counties. 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 2002 would be 1,653,900. This represents an overall increase of 21.1 percent, which translates to an average annual increase of 2.2 percent over the 9-year period.

The change in the geographical definition of Dallas 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 Dallas metropolitan area as defined in both 2002 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 2002 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 2,105 sample units that were common to the 2002 and 2011 AHS Dallas surveys and satisfied all the analytical requirements.<sup>4</sup> Between 2002 and 2011, 89 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 2,194 sample units. Between 2002 and 2011, 518 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 2,623 sample units. In the forward-looking analysis, the average weight of a sample unit is approximately 622 units; in the backward-looking analysis, the average weight of a sample unit is approximately 645 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 Dallas, 9 years separate the 2011 sample from the 2002 sample. As a result, explaining the loss or addition of sample units is very 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: 2002–2011***

### **Losses between 2002 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.

---

<sup>4</sup> The 2002 AHS surveyed 5,743 units in the Dallas metropolitan area; 2,907 of these units were in the 2011 AHS public use file (PUF). Of the 2,836 sample units no longer in the survey, 773 were legitimate temporary or permanent losses to the housing stock and were considered for the analysis. The remaining 2,063 cases are coded as “sample reduction for the current survey year” with no further explanation.

Table 1 reports that, between 2002 and 2011, 22,400 units left the housing stock.<sup>5</sup> Of these, 16,400 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 4,100 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 1,900 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 2002 Dallas Housing Units in 2011<sup>6</sup>**

Present in 2002	1,365,500
2002 units present in 2011	1,343,100
<b>Units no longer in the stock</b>	<b>22,400</b>
2002 units lost due to conversion/merger	800
2002 house or mobile home moved out	200
2002 units lost through demolition or disaster	15,400
<b>Permanent losses</b>	<b>16,400</b>
2002 units changed to nonresidential use	2,300
2002 units badly damaged or condemned	1,800
<b>Temporary losses</b>	<b>4,100</b>
<b>2002 units lost in other ways</b>	<b>1,900</b>

Demolitions and natural disasters accounted for 15,400 of the permanent losses, while mergers and conversions contributed another 800 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. The 2011 AHS survey in Dallas did track mobile home move-outs, a factor that resulted in the loss of 200 units.

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 2002. For each subgroup, these tables detail how many of the 2002 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 2002–2011 period.

<sup>5</sup> With the caveats noted in Appendix A, this analysis applies to the area common to both the 2002 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 2002 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 2002 and 2011.<sup>7</sup>

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

2011 housing stock	1,691,100
2011 units present in 2002	1,407,700
<b>Total additions to stock</b>	<b>283,400</b>
Units added by new construction	274,700
House or mobile home moved in	4,300
Units added by conversion/merger	0
<b>New or reconstructed units</b>	<b>279,000</b>
Units added from nonresidential use	2,900
Units added from temporary losses	1,000
<b>Recovered units</b>	<b>3,900</b>
<b>Units added in other ways</b>	<b>500</b>

In the period between the 2002 and the 2011 AHS surveys, 283,400 units were added to the housing stock. Ninety-seven percent of these additions were newly constructed units. The 2011 AHS did track move-ins of mobile homes in Dallas, a factor that contributed 4,300 units. No units were formed from the conversion or merger of 2002 units.

We classified 3,900 units as recovered because these units had been in the housing stock at some point but were classified in 2002 as nonresidential (2,900) or uninhabitable (1,000). Finally, 500 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 2002–2011 period.

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

The Dallas metropolitan area lost 1.6 percent of all 2002 housing units by 2011, but the loss rate varied across sectors of the stock. For example, the occupied housing stock lost 1.3 percent of its units between 2002 and 2011.

---

<sup>7</sup> With the caveats noted in Appendix A, this analysis applies to the area common to both the 2002 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 2002 Dallas 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 Dallas, 2002–2011<sup>9</sup>**

Characteristics	Present in 2002	Total lost	Percent lost
<i>Housing stock</i>	1,365,500	22,400	1.6%
<i>Occupancy status</i>			
Occupied	1,235,300	16,600	1.3%
Vacant	127,900	5,800	4.5% **
<i>Units in structure</i>			
1, detached	827,900	5,800	0.7% ***
5 to 9	77,400	4,700	6.1% **
<i>Year built</i>			
2000–2004	91,400	500	0.6% *
1995–1999	136,400	300	0.2% ***
1985–1989	158,300	700	0.5% **
1980–1984	221,300	1,000	0.5% **
<i>Rooms</i>			
4	219,800	9,000	4.1% **
7	186,800	1,100	0.6% *
<i>Bedrooms</i>			
None	7,600	1,500	19.5% **
2	290,100	9,700	3.4% **
3	512,400	3,100	0.6% ***
4 or more	299,700	500	0.2% ***
<i>Multiunit structures</i>	317,100	11,900	3.7% **
<i>Stories in structure</i>			
2	199,000	11,100	5.6% ***
3	62,700	300	0.4% *
<i>Age of householder</i>			
65 to 74	76,600	200	0.3% *
<i>Race and ethnicity</i>			
Hispanic or Latino (any race)	222,500	6,500	2.9% *
<i>Tenure</i>			
Owner-occupied	784,100	3,600	0.5% ***
Renter-occupied	451,200	12,900	2.9% **
<i>Renter monthly housing costs</i>			
\$350 to \$599	113,200	5,300	4.7% **
<i>Renter household income</i>			
\$15,000 to \$29,999	109,200	4,000	3.7% *
<i>Owner monthly housing costs</i>			
\$1,250 or more	308,300	600	0.2% ***
<i>Owner household income</i>			
\$50,000 to \$99,999	287,600	200	0.1% ***
\$100,000 or more	225,600	600	0.3% ***

\*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.

<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.

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

- Among units that were vacant in 2002, the loss rate was much higher.
- Single-family detached units had a lower-than-average loss rate, as did recently built units (1980–1989 and 1995–2002). Units in multifamily structures had high loss rates.
- Small units (4 rooms or 0 or 2 bedrooms) had high loss rates, while large units (7 rooms or 3 or more bedrooms) had low loss rates.
- Units occupied in 2002 by households with Hispanic householders had a higher-than-average loss rate.
- Units that were owner-occupied in 2002 experienced a low loss rate, but units that were renter-occupied had a high loss rate.
- Among 2002 rental units, those with low rents (\$350–\$599) and those occupied by low-income households (\$15,000–\$29,999) had high loss rates.
- Among owner-occupied units, those occupied in 2002 by higher income households (\$50,000 or more) and those with high monthly housing costs (\$1,250 or more) had very low rates.

The 283,400 additions reported in Table 2 represented 16.8 percent of the 2011 housing stock. The rates of addition varied by the characteristics of the housing. Additions represented 17.1 percent of occupied units.

We examined all of the components of the 2002 Dallas 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 Dallas, 2002–2011<sup>10</sup>**

Characteristics	Present in 2011	Total additions	Percent additions
<i>Housing stock</i>	1,691,100	283,400	16.8%
<i>Occupancy status</i>			
Occupied	1,545,500	263,600	17.1%
Vacant	143,300	19,600	13.7%
<i>Units in structure</i>			
1, detached	1,088,000	208,400	19.2%**
1, attached	64,800	16,000	24.7%*
2 to 4	76,700	8,100	10.5%**
5 to 9	133,300	6,900	5.2%***
10 to 19	149,300	8,000	5.3%***
50 or more	54,200	17,000	31.3%***
<i>Rooms</i>			
3	174,300	20,200	11.6%***
4	256,600	26,600	10.4%***
5	284,500	34,600	12.1%***
8	172,300	39,200	22.8%**
9	102,900	30,700	29.8%***
10 or more	108,800	45,700	42.0%***
<i>Bedrooms</i>			
1	285,000	29,800	10.5%***
2	319,100	38,400	12.0%***
3	620,700	87,500	14.1%**
4 or more	458,200	127,200	27.7%***
<i>Multiunit structures</i>	488,100	51,500	10.6%***
<i>Stories in structure</i>			
2	282,700	10,500	3.7%***
4 to 6	18,200	12,200	66.8%***
<i>Lacking complete kitchen facilities</i>	20,500	1,200	5.7%***
<i>Lacking some plumbing</i>	23,200	600	2.5%***
<i>Severe problems</i>	23,200	600	2.5%***
<i>Moderate problems</i>			
Heating	20,500	1,200	5.7%***
Kitchen	20,500	1,100	5.6%***
<i>Age of householder</i>			
65 to 74	120,600	13,800	11.5%**
75 or older	91,100	8,800	9.6%***
<i>Children in household</i>			
Some	634,700	125,000	19.7%*

<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.

<b>Characteristics</b>	<b>Present in 2011</b>	<b>Total additions</b>	<b>Percent additions</b>
<i>Race and ethnicity</i>			
White	1,168,700	173,900	14.9%*
White Hispanic	334,900	30,200	9.0%***
Black	236,500	58,900	24.9%***
Black Non-Hispanic	231,200	58,100	25.1%***
Asian	103,100	24,900	24.2%***
Hispanic or Latino (any race)	355,400	32,800	9.2%***
<i>Tenure</i>			
Owner-occupied	950,800	181,600	19.1%
Renter-occupied	594,700	82,000	13.8%**
<i>Renter monthly housing costs</i>			
\$350 to \$599	63,200	5,600	8.8%***
\$600 to \$799	150,200	7,300	4.9%***
\$800 to \$1,249	232,200	28,700	12.3%**
\$1,250 or more	110,600	35,900	32.5%***
<i>Renter household income</i>			
Less than \$15,000	133,700	15,200	11.3%**
\$15,000 to \$29,999	123,600	10,300	8.3%***
\$30,000 to \$49,999	135,000	14,200	10.5%***
\$100,000 or more	52,700	15,400	29.2%**
<i>Owner monthly housing costs</i>			
Less than \$350	22,200	1,700	7.7%*
\$350 to \$599	100,900	7,500	7.4%***
\$600 to \$799	87,500	4,400	5.0%***
\$800 to \$1,249	190,800	20,600	10.8%***
\$1,250 or more	549,300	147,400	26.8%***
<i>Owner household income</i>			
\$15,000 to \$29,999	116,300	12,500	10.8%**
\$30,000 to \$49,999	148,600	17,300	11.7%**
\$50,000 to \$99,999	278,400	61,200	22.0%**
\$100,000 or more	337,500	82,400	24.4%***

\*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 a detailed story about changes in the Dallas housing stock.

- The rate of addition was high among both single-family detached and single-family attached units.
- Overall, units in multifamily structures experienced a low rate of addition, and this was particularly the case among units in small multifamily structures (2–4 units, 5–9 units, 10–19 units, 2 stories). However, units in large multifamily buildings (50 or more units or 4–6 floors) had high rates of addition.
- The rate of addition varied directly with unit size, with smaller units having lower rates and larger units having higher rates. This was true when measuring size either by number of rooms or number of bedrooms.



- New additions to the stock were underrepresented among units in 2011 with quality problems, specifically severe physical problems, lacking complete plumbing, lacking complete kitchen facilities, or moderate heating problems.
- Units with older (65 years or older) householders in 2011 had low rates of addition, whereas those with children had a higher-than-average rate.
- Units with Hispanic or White householders in 2011 had low rates of addition, whereas those with Black or Asian householders had higher-than-average rates.
- The rate of addition was low among units that were renter-occupied in 2011, and the rate of addition varied with both monthly housing costs and household income. Rental units with housing costs of \$1,250 or more or with households earning \$100,000 or more had high rates of addition. Most of the other housing cost and household income categories among renters had rates of addition that were statistically different and lower than the rate for all occupied units.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units but not statistically different. As with the rental stock, the rate of addition among the owner subgroups varied with both monthly housing costs and household income. Owner-occupied units with housing costs of \$1,250 or more or with households earning \$50,000 or more had high rates of addition. Most of the other housing cost and household income categories among owners had rates of addition that were statistically different and lower than the rate for all occupied units.

## ***5. Rental Market Dynamics: 2002–2011***

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 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 2002 rental units by how affordable they were in 2002. 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 Dallas**

Affordability categories	2002 rental units	To more affordable categories in 2011	In same affordability category in both years	To less affordable categories in 2011	2002 rental units non-rental in 2011
Non-market	79,300	NA	20.5%	65.7%	13.9%
Extremely low rent	28,300	9.9%	4.3%	49.2%	36.6%
Very low rent	264,400	5.3%	35.1%	48.6%	11.0%
Low rent	83,900	11.1%	19.3%	60.8%	8.8%
Moderate rent	61,400	8.3%	51.3%	28.0%	12.4%
High rent	13,100	36.6%	26.6%	16.9%	19.9%
Very high rent	3,400	21.3%	0.0%	33.3%	45.4%
Extremely high rent	3,400	50.4%	32.7%	NA	16.9%
Total	537,200	7.2%	30.3%	49.5%	13.1%

The 2002 rental stock in Dallas was affordable. Of the 537,200 rental units in 2002, 292,700 were extremely low rent or very low rent units. In addition, 79,300 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 69.2 percent of the 2002 rental stock. The three highest rent categories comprised only 3.7 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—49.5 percent of all 2002 units compared to 7.2 percent.

By 2011, 13.1 percent of the 537,200 rental units in 2002 were no longer in the rental stock (70,400 units). The largest proportion of these losses was due to changes in tenure, with 45,600 rental units becoming owner-occupied or vacant for sale in 2011. Another 7,500 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for

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

migratory workers. Finally, 17,300 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 2002, 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 Dallas was less affordable in 2011 than in 2002. Of the 683,900 rental units in 2011, 168,100 were extremely low rent or very low rent units. In addition, 56,800 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 32.9 percent of the 2011 rental stock. The three highest rent categories comprised 16.3 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—40.8 percent of all 2011 units compared to 6.1 percent.

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

Affordability categories	2011 rental units	From more affordable categories in 2002	In same affordability category in both years	From less affordable categories in 2002	2011 rental units non-rental in 2002
Non-market	56,800	NA	31.4%	32.5%	36.1%
Extremely low rent	9,200	6.8%	14.6%	48.6%	30.0%
Very low rent	158,900	17.8%	61.5%	5.4%	15.4%
Low rent	143,600	68.7%	12.0%	3.4%	15.9%
Moderate rent	203,700	56.7%	16.5%	1.5%	25.3%
High rent	63,100	39.0%	6.0%	3.0%	52.0%
Very high rent	29,600	28.2%	0.0%	0.0%	71.8%
Extremely high rent	18,900	15.3%	6.6%	NA	78.1%
Total	683,900	40.8%	25.3%	6.1%	27.9%

Of the 683,900 rental units in 2011, 27.9 percent were not rental in 2002 (190,900 units). A large proportion of these gains were due to changes in tenure, with 93,100 rental units having been owner-occupied or vacant for sale in 2002. Another 4,800 units had been seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 93,200 rental units had not been in the housing stock in 2002. Most of these—87,700 units—were added by new construction; another 5,500 were added by other means. Backward-Looking Rental Dynamics Table 2 shows how the movement into the rental stock varied across the affordability categories.

## **6. Summary of Housing Market Changes: Dallas Metropolitan Area, 2002–2011**

In 2002 the Dallas metropolitan area contained 1,365,600 housing units, including vacant units. By 2011 the number of housing units had increased to 1,691,000. Part of this increase was due to a redefinition of the metropolitan area that added Delta and Hunt Counties. We estimate that the 2011 count of housing units for the metropolitan area as defined in 2002 would be 1,653,900. This represents an overall increase of 21.1 percent, which translates to an average annual increase of 2.2 percent over the 9-year period.

The change in the geographical definition of Dallas 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 Dallas metropolitan area as defined in both 2002 and 2011.

Between 2002 and 2011, 22,400 units left the housing stock. Of these, 16,400 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 4,100 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 1,900 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 15,400 of the permanent losses, while mergers and conversions contributed another 800 permanent losses. “Conversion” is the terminology used in the AHS for the splitting of a unit into two or more units. The 2011 AHS survey in Dallas did track mobile home move-outs, a factor that resulted in the loss of 200 units.

In the period between the 2002 and the 2011 AHS surveys, 283,400 units were added to the housing stock. Ninety-seven percent of these additions were newly constructed units. The 2011 AHS did track move-ins of mobile homes in Dallas, a factor that contributed 4,300 units. No units were formed from the conversion or merger of 2002 units. We classified 3,900 units as recovered because these units had been in the housing stock at some point but were classified in 2002 as nonresidential (2,900) or uninhabitable (1,000). Finally, 500 units were added in other unclassified ways.

The Dallas metropolitan area lost 1.6 percent of all 2002 housing units by 2011; 283,400 additions between 2002 and 2011 represented 16.8 percent of the 2011 housing stock. Losses and additions varied across portions of the Dallas 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:

- Among units that were vacant in 2002, the loss rate was much higher.
- Single-family detached units had a lower-than-average loss rate, as did recently built units (1980–1989 and 1995–2002). Units in multifamily structures had high loss rates.
- Small units (4 rooms or 0 or 2 bedrooms) had high loss rates, while large units (7 rooms or 3 or more bedrooms) had low loss rates.

- Units occupied in 2002 by households with Hispanic householders had a higher-than-average loss rate.
- Units that were owner-occupied in 2002 experienced a low loss rate, but units that were renter-occupied had a high loss rate.
- Among 2002 rental units, those with low rents (\$350–\$599) and those occupied by low-income households (\$15,000–\$29,999) had high loss rates.
- Among owner-occupied units, those occupied in 2002 by higher income households (\$50,000 or more) and those with high monthly housing costs (\$1,250 or more) had very low rates.
- The rate of addition was high among both single-family detached and single-family attached units.
- Overall, units in multifamily structures experienced a low rate of addition, and this was particularly the case among units in small multifamily structures (2–4 units, 5–9 units, 10–19 units, 2 stories). However, units in large multifamily buildings (50 or more units or 4–6 floors) had high rates of addition.
- The rate of addition varied directly with unit size, with smaller units having lower rates and larger units having higher rates. This was true when measuring size either by number of rooms or number of bedrooms.
- New additions to the stock were underrepresented among units in 2011 with quality problems, specifically severe physical problems, lacking complete plumbing, lacking complete kitchen facilities, or moderate heating problems.
- Units with older (65 years or older) householders in 2011 had low rates of addition, whereas those with children had a higher-than-average rate.
- Units with Hispanic or White householders in 2011 had low rates of addition, whereas those with Black or Asian householders had higher-than-average rates.
- The rate of addition was low among units that were renter-occupied in 2011, and the rate of addition varied with both monthly housing costs and household income. Rental units with housing costs of \$1,250 or more or with households earning \$100,000 or more had high rates of addition. Most of the other housing cost and household income categories among renters had rates of addition that were statistically different and lower than the rate for all occupied units.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units but not statistically different. As with the rental stock, the rate of addition among the owner subgroups varied with both monthly housing costs and household income. Owner-occupied units with housing costs of \$1,250 or more or with

households earning \$50,000 or more had high rates of addition. Most of the other housing cost and household income categories among owners had rates of addition that were statistically different and lower than the rate for all occupied units.

The 2002 rental stock in Dallas was affordable. Of the 537,200 rental units in 2002, 292,700 were extremely low rent or very low rent units. In addition, 79,300 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 69.2 percent of the 2002 rental stock. The three highest rent categories comprised only 3.7 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—49.5 percent of all 2002 units compared to 7.2 percent. By 2011, 13.1 percent of the 537,100 rental units in 2002 were no longer in the rental stock (70,400 units). The largest proportion of these losses was due to changes in tenure, with 45,600 rental units becoming owner-occupied or vacant for sale in 2011.

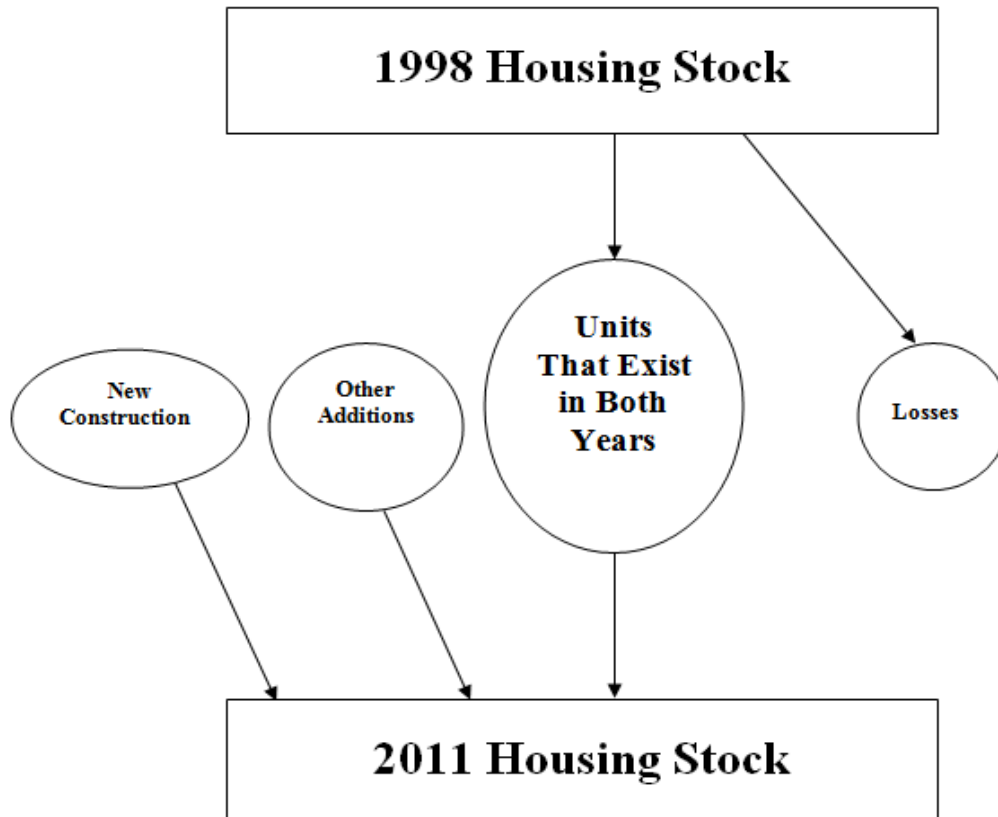
The rental stock in Dallas was less affordable in 2011 than in 2002. Of the 683,900 rental units in 2011, 168,100 were extremely low rent or very low rent units. In addition, 56,800 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 32.9 percent of the 2011 rental stock. The three highest rent categories comprised 16.3 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—40.8 percent of all 2011 units compared to 6.1 percent. Of the rental units in 2011, 27.9 percent were not rental in 2002 (190,900 units); changes in tenure (93,100 units) and new construction (87,700 units) account for most of the new rental units.

## 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 2002 and 2011 housing stocks) and one oval (units added through new construction between 2002 and 2011). No one estimates the other three ovals: the number of units that belong to both the 2002 and 2011 housing stock, units lost to the housing stock between 2002 and 2011, and other additions to the housing stock between 2002 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.

---

<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, 2002, 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 2002 and 2011. In some cases, there may be no status, (e.g., not yet constructed in 2002) 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 2002 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 2002 became owner-occupied or vacant for sale in 2011. To estimate the number of units in the national housing stock that were rental in 2002 and became owner-occupied in 2011, one would need to apply weights. However, using 2002 weights would produce a different estimate than using 2011 weights. There is no conceptual reason to favor the answer using 2002 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 (2002) 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 (2002). 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.

---

<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 2002 and 2011, and the application to the common area is not precise for the following reasons:

- For forward-looking analysis (2002 to 2011), we observe only those sample units in the geography common to both 2002 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 2002 geography. Since the common area is smaller than the 2002 geography, the counts are overestimates for the common area.
- For the backward-looking analysis (2011 from 2002), we observe (a) sample units that were in the common area in 2002 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 2002 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 2002 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 2002 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 2002.

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 2002 housing stock by 2011. There are three possible dispositions of 2002 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 2002. There are three possible sources of 2011 units:

- Units that existed in 2002 with the same characteristics (or serving the same market).

- Units that existed in 2002 but with different characteristics (or serving a different market).
- Units that are additions to the housing stock between 2002 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 (2002 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 2002 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 2002 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 2002.
- Column H is the CINCH estimate of the number of units from column B that were newly constructed between 2002 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

---

<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 2002.<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 2002 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 2002 housing stock relate to the 2011 housing stock. Column A estimates the number of units in each affordability category in 2002. Columns B through L explain where the 2002 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 2002 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.

---

<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 2002 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 2002, they will be counted in columns B through I, depending upon how affordable they are in 2002.
- 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 2002 are counted in column K.
- Column L counts rental units that were newly constructed between 2002 and 2011.
- Column M counts rental units that were added to the housing stock after 2002 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 9-year period; for example, a unit that is low rent in 2002 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 2002 and 2011.

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

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
1	Housing stock	1,365,500	1,343,100	0	800	200	2,300	15,400	1,800	1,900	1
	Occupancy status										
2	Occupied	1,235,300	1,096,700	122,000	500	0	1,800	12,200	1,100	1,000	2
3	Vacant	127,900	21,300	100,700	200	200	500	3,200	700	900	3
4	Seasonal	2,300	500	1,800	0	0	0	0	0	0	4
	Units in structure										
5	1, detached	827,900	822,000	0	200	0	1,600	2,300	1,400	300	5
6	1, attached	164,400	159,700	0	300	0	200	3,900	0	200	6
7	2 to 4	58,900	57,100	0	0	0	200	1,400	0	200	7
8	5 to 9	77,400	72,700	0	0	0	0	4,200	500	0	8
9	10 to 19	93,100	91,500	0	0	0	0	1,600	0	0	9
10	20 to 49	50,400	48,700	0	0	200	0	200	0	1,200	10
11	50 or more	37,400	35,300	0	200	0	200	1,600	0	0	11
12	Manufactured/mobile home	56,100	56,100	0	0	0	0	0	0	0	12



	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/ merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
	Year built										
15	2000–2004	91,400	90,900	0	0	0	0	300	0	300	15
16	1995–1999	136,400	136,100	0	0	0	300	0	0	0	16
17	1990–1994	101,000	101,000	0	0	0	0	0	0	0	17
18	1985–1989	158,300	157,600	0	0	0	0	700	0	0	18
19	1980–1984	221,300	220,300	0	0	0	200	500	300	0	19
20	1975–1979	137,100	134,400	0	0	200	200	2,000	200	0	20
21	1970–1974	119,400	115,800	0	200	0	0	3,200	0	200	21
22	1960–1969	182,200	176,600	0	0	0	1,500	3,600	0	400	22
23	1950–1959	110,600	107,700	0	200	0	0	2,100	200	300	23
24	1940–1949	54,400	52,400	0	0	0	0	1,500	500	0	24
25	1930–1939	38,400	36,300	0	300	0	0	1,100	200	500	25
26	1920–1929	8,000	7,300	0	0	0	0	0	500	200	26
27	1919 or earlier	7,000	6,700	0	0	0	0	300	0	0	27
	Rooms										
28	1	4,300	2,000	1,600	0	0	0	0	0	700	28
29	2	8,300	1,500	6,200	0	200	0	500	0	0	29
30	3	165,800	103,100	60,200	200	0	500	1,900	0	0	30
31	4	219,800	116,900	93,900	300	0	200	8,200	0	300	31
32	5	266,500	129,500	131,700	0	0	0	3,200	1,200	1,000	32
33	6	258,200	148,500	107,000	200	0	1,300	500	700	0	33
34	7	186,800	94,800	90,900	0	0	300	800	0	0	34
35	8	118,800	57,100	61,700	0	0	0	0	0	0	35
36	9	73,200	26,400	46,800	0	0	0	0	0	0	36
37	10 or more	63,700	32,600	30,700	0	0	0	300	0	0	37

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/ merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
	Bedrooms										
38	None	7,600	3,100	3,000	0	0	200	500	0	700	38
39	1	255,700	227,800	20,300	500	200	200	6,600	0	0	39
40	2	290,100	230,600	49,800	0	0	200	7,200	1,200	1,200	40
41	3	512,400	435,000	74,300	200	0	1,600	600	700	0	41
42	4 or more	299,700	251,600	47,600	0	0	0	500	0	0	42
43	Multiunit structures										43
	Stories in structure	317,100	305,300	0	200	200	400	9,100	500	1,400	
44	1										44
45	2	22,400	22,400	0	0	0	0	0	0	0	45
46	3	199,000	187,900	0	200	200	200	8,900	500	1,100	46
47	4 to 6	62,700	62,400	0	0	0	0	0	0	300	47
48	7 or more	33,100	32,600	0	0	0	200	300	0	0	48

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

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
1	Occupied units	1,235,300	1,096,700	122,000	500	0	1,800	12,200	1,100	1,000	1
2	With complete kitchen	1,214,500	1,063,600	135,300	500	0	1,800	11,200	1,100	1,000	2
3	Lacking complete kitchen facilities	20,800	1,000	18,800	0	0	0	1,000	0	0	3
4	With complete plumbing	1,226,300	1,069,100	141,100	500	0	1,800	11,900	1,100	700	4
5	Lack some plumbing	9,000	0	8,500	0	0	0	300	0	200	5
6	No hot piped water	1,000	0	700	0	0	0	300	0	0	6
7	No bathtub/shower	500	0	0	0	0	0	300	0	200	7
8	No flush toilet	500	0	0	0	0	0	300	0	200	8
9	No exclusive use	7,800	0	7,800	0	0	0	0	0	0	9
	Water										
10	Public/private water	1,230,800	1,092,200	122,500	500	0	1,800	11,900	900	1,000	10
11	Well serving 1 to 5 units	2,200	1,200	700	0	0	0	0	200	0	11
12	Other water source	2,300	0	2,000	0	0	0	300	0	0	12
	Sewer										
13	Public sewer	1,140,200	1,014,500	112,100	500	0	200	11,200	700	1,000	13
14	Septic tank/cesspool	94,800	71,800	20,300	0	0	1,600	600	400	0	14
15	Other	300	0	0	0	0	0	300	0	0	15

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
16	Severe problems	22,800	600	21,600	0	0	0	300	0	200	16
17	Plumbing	9,000	0	8,500	0	0	0	300	0	200	17
18	Heating	11,400	0	11,400	0	0	0	0	0	0	18
19	Electric	1,500	0	1,200	0	0	0	300	0	0	19
20	Upkeep	1,200	0	1,200	0	0	0	0	0	0	20
21	Moderate problems	66,600	19,500	44,800	0	0	0	2,000	200	0	21
22	Plumbing	1,800	0	1,800	0	0	0	0	0	0	22
23	Heating	23,100	16,500	5,300	0	0	0	900	200	200	23
24	Kitchen	20,800	1,000	18,800	0	0	0	1,000	0	0	24
25	Upkeep	27,500	3,200	23,400	0	0	0	1,000	0	0	25

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

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
1	Occupied units	1,235,300	1,096,700	122,000	500	0	1,800	12,200	1,100	1,000	1
	Age of householder										
2	Under 65	1,078,000	868,200	195,300	500	0	500	11,300	1,100	1,000	2
3	65 to 74	76,600	7,500	68,900	0	0	0	200	0	0	3
4	75 or older	80,700	25,200	53,500	0	0	1,300	600	0	0	4
	Children in household										
5	Some	528,500	280,900	241,000	200	0	200	5,000	500	700	5
6	None	706,800	455,000	241,800	300	0	1,600	7,200	700	200	6
	Race and ethnicity										
7	White	886,300	712,600	164,600	300	0	1,600	6,300	400	500	7
8	Hispanic	99,700	69,200	27,600	0	0	0	2,700	0	200	8
9	Non-Hispanic	786,600	556,900	223,400	300	0	1,600	3,600	400	200	9
10	Black	158,900	82,100	73,600	0	0	0	2,200	700	300	10
11	Hispanic	2,500	700	1,800	0	0	0	0	0	0	11
12	Non-Hispanic	156,400	77,900	75,300	0	0	0	2,200	700	300	12
13	American Indian or Alaska Native alone	3,200	700	2,500	0	0	0	0	0	0	13
14	Asian or Pacific Islander	53,100	22,600	30,000	0	0	0	500	0	0	14
16	Other	133,800	0	130,000	200	0	200	3,200	0	200	16
17	Hispanic or Latino (any race)	222,500	154,400	61,700	200	0	200	5,600	0	400	17

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
	Income sources of families and primary individuals										
18	Wages and salaries	1,097,700	809,700	274,800	500	0	500	10,100	900	1,000	18
20	Dividends, interest, or rent	431,100	135,700	290,600	0	0	1,800	2,800	0	200	20
21	Public assistance or public welfare	33,900	700	32,300	0	0	0	700	200	0	21

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

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
1	Occupied units	1,235,300	1,096,700	122,000	500	0	1,800	12,200	1,100	1,000	1
	Tenure										
2	Owner-occupied	784,100	650,900	129,500	0	0	1,600	1,800	200	0	2
3	Homeownership rate	63.5%									3
4	Renter-occupied	451,200	329,400	108,900	500	0	200	10,300	900	1,000	4
	Renter monthly housing costs										
5	No cash rent	9,200	1,800	7,100	0	0	0	300	0	0	5
6	Less than \$350	19,600	5,000	13,900	0	0	0	200	500	0	6
7	\$350 to \$599	113,200	27,200	80,600	0	0	200	4,400	200	500	7
8	\$600 to \$799	166,400	62,600	99,200	0	0	0	4,200	0	400	8
9	\$800 to \$1,249	117,200	63,400	51,900	500	0	0	1,100	200	0	9
10	\$1,250 or more	25,600	11,600	14,000	0	0	0	0	0	0	10
	Renter household income										
11	Less than \$15,000	73,200	21,200	49,400	0	0	0	2,000	500	200	11
12	\$15,000 to \$29,999	109,200	22,700	82,500	0	0	0	3,500	0	500	12
13	\$30,000 to \$49,999	141,000	31,800	106,400	0	0	0	2,500	200	0	13
14	\$50,000 to \$99,999	105,200	21,100	81,500	500	0	200	1,600	0	200	14
15	\$100,000 or more	22,700	3,900	17,800	0	0	0	700	200	0	15

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 2002	2002 units present in 2011	Change in characteristics	2002 units lost due to conversion/merger	2002 house or mobile home moved out	2002 units changed to nonresidential use	2002 units lost through demolition or disaster	2002 units badly damaged or condemned	2002 units lost in other ways	Row
	Owner monthly housing costs										
16	Less than \$350	94,300	6,900	86,500	0	0	0	600	200	0	16
17	\$350 to \$599	112,900	18,500	92,500	0	0	1,300	600	0	0	17
18	\$600 to \$799	82,200	13,700	68,200	0	0	0	300	0	0	18
19	\$800 to \$1,249	186,400	44,000	142,400	0	0	0	0	0	0	19
20	\$1,250 or more	308,300	206,900	100,900	0	0	300	300	0	0	20
	Owner household income										
21	Less than \$15,000	41,600	7,300	34,000	0	0	0	300	0	0	21
22	\$15,000 to \$29,999	77,500	15,900	60,300	0	0	1,300	0	0	0	22
23	\$30,000 to \$49,999	151,800	27,100	123,500	0	0	0	1,300	0	0	23
24	\$50,000 to \$99,999	287,600	84,000	203,400	0	0	0	0	200	0	24
25	\$100,000 or more	225,600	116,200	108,800	0	0	300	300	0	0	25



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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
1	Housing stock	1,691,100	1,407,700	0	0	4,300	2,900	274,700	1,000	500	1
	Occupancy status										
2	Occupied	1,545,500	1,176,400	105,500	0	3,900	500	258,200	1,000	0	2
3	Vacant	143,300	18,600	105,100	0	400	2,400	16,300	0	500	3
4	Seasonal	2,300	300	1,800	0	0	0	200	0	0	4
	Units in structure										
5	1, detached	1,088,000	879,600	0	0	0	500	206,800	600	500	5
6	1, attached	64,800	48,800	0	0	0	300	15,300	400	0	6
7	2 to 4	76,700	68,600	0	0	0	0	8,100	0	0	7
8	5 to 9	133,300	126,400	0	0	0	0	6,900	0	0	8
9	10 to 19	149,300	141,300	0	0	0	0	8,000	0	0	9
10	20 to 49	74,700	63,100	0	0	0	400	11,200	0	0	10
11	50 or more	54,200	37,200	0	0	0	0	17,000	0	0	11
12	Manufactured/mobile home	50,200	42,700	0	0	4,300	1,600	1,500	0	0	12

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
	Year built										
13	2010–2014	18,400	0	0	0	0	0	18,400	0	0	13
14	2005–2009	174,300	800	0	0	0	0	173,500	0	0	14
15	2000–2004	159,400	90,500	0	0	400	0	68,500	0	0	15
16	1995–1999	157,500	144,200	0	0	0	0	13,300	0	0	16
17	1990–1994	109,200	108,100	0	0	0	0	1,100	0	0	17
18	1985–1989	170,400	169,600	0	0	800	0	0	0	0	18
19	1980–1984	223,600	221,300	0	0	1,600	800	0	0	0	19
20	1975–1979	146,800	144,300	0	0	800	1,600	0	0	0	20
21	1970–1974	119,100	118,300	0	0	800	0	0	0	0	21
22	1960–1969	187,700	187,200	0	0	0	500	0	0	0	22
23	1950–1959	115,000	115,000	0	0	0	0	0	0	0	23
24	1940–1949	57,000	56,400	0	0	0	0	0	600	0	24
25	1930–1939	38,000	37,100	0	0	0	0	0	400	500	25
26	1920–1929	7,600	7,600	0	0	0	0	0	0	0	26
27	1919 or earlier	7,200	7,200	0	0	0	0	0	0	0	27

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
	Rooms										
28	1	3,000	1,800	1,100	0	0	0	0	0	0	28
29	2	8,800	1,500	6,300	0	0	0	600	0	500	29
30	3	174,300	106,200	47,900	0	0	400	19,400	400	0	30
31	4	256,600	118,400	111,600	0	0	800	25,800	0	0	31
32	5	284,500	135,400	114,500	0	2,300	0	32,200	0	0	32
33	6	343,300	153,800	139,900	0	1,900	1,600	45,300	600	0	33
34	7	236,600	97,700	103,200	0	0	0	35,800	0	0	34
35	8	172,300	61,500	71,500	0	0	0	39,200	0	0	35
36	9	102,900	28,300	43,900	0	0	0	30,700	0	0	36
37	10 or more	108,800	34,700	28,400	0	0	0	45,700	0	0	37
	Bedrooms										
38	None	8,100	2,900	4,600	0	0	0	600	0	0	38
39	1	285,000	239,000	16,100	0	0	400	28,500	400	500	39
40	2	319,100	238,800	41,900	0	1,600	2,400	34,400	0	0	40
41	3	620,700	454,100	79,100	0	2,700	0	84,100	600	0	41
42	4 or more	458,200	267,700	63,400	0	0	0	127,200	0	0	42
43	Multiunit structures	488,100	436,600	0	0	0	400	51,100	0	0	43
	Stories in structure										
44	1	54,400	47,600	0	0	0	0	6,800	0	0	44
45	2	282,700	272,200	0	0	0	0	10,500	0	0	45
46	3	127,500	106,500	0	0	0	400	20,600	0	0	46
47	4 to 6	18,200	6,100	0	0	0	0	12,200	0	0	47
48	7 or more	5,300	4,200	0	0	0	0	1,100	0	0	48

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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
1	Occupied units	1,545,500	1,176,400	105,500	0	3,900	500	258,200	1,000		1
2	With complete kitchen	1,525,000	1,139,800	122,800	0	3,900	500	257,100	1,000		2
3	Lacking complete kitchen facilities	20,500	1,100	18,200	0	0	0	1,200	0		3
4	With complete plumbing	1,522,300	1,146,500	112,800	0	3,900	500	257,600	1,000		4
5	Lack some plumbing	23,200	0	22,600	0	0	0	600	0		5
6	No hot piped water	1,300	0	1,300	0	0	0	0	0		6
7	No bathtub/shower	800	0	800	0	0	0	0	0		7
8	No flush toilet										8
9	No exclusive use	21,100	0	20,600	0	0	0	600	0		9
	Water										
10	Public/private water	1,539,700	1,170,400	106,300	0	3,900	500	257,600	1,000		10
11	Well serving 1 to 5 units	5,300	2,500	2,200	0	0	0	600	0		11
12	Other water source	500	0	500	0	0	0	0	0		12
	Sewer										
13	Public sewer	1,457,400	1,091,400	115,600	0	3,900	500	245,000	1,000		13
14	Septic tank/cesspool	88,100	73,700	1,200	0	0	0	13,200	0		14
15	Other										15

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
16	Severe problems	32,600	700	30,700	0	0	0	1,100	0		16
17	Plumbing	23,200	0	22,600	0	0	0	600	0		17
18	Heating	8,600	0	8,000	0	0	0	600	0		18
19	Electric										19
20	Upkeep	800	0	800	0	0	0	0	0		20
21	Moderate problems	58,100	21,300	35,100	0	0	0	1,700	0		21
22	Plumbing	5,100	0	5,100	0	0	0	0	0		22
23	Heating	20,400	18,000	2,400	0	0	0	0	0		23
24	Kitchen	20,500	1,100	18,200	0	0	0	1,200	0		24
25	Upkeep	20,500	3,400	15,900	0	0	0	1,100	0		25

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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
1	Occupied units	1,545,500	1,176,400	105,500	0	3,900	500	258,200	1,000	0	1
	Age of householder										
2	Under 65	1,333,800	934,600	158,200	0	3,900	500	235,600	1,000	0	2
3	65 to 74	120,600	8,100	98,600	0	0	0	13,800	0	0	3
4	75 or older	91,100	26,200	56,200	0	0	0	8,800	0	0	4
	Children in household										
5	Some	634,700	300,800	208,900	0	2,300	500	122,200	0	0	5
6	None	910,800	490,000	282,200	0	1,600	0	136,100	1,000	0	6
	Race and ethnicity										
7	White	1,168,700	759,100	235,600	0	3,900	500	168,600	1,000	0	7
8	Hispanic	334,900	73,400	231,300	0	3,100	500	26,600	0	0	8
9	Non-Hispanic	833,800	593,000	97,100	0	800	0	141,900	1,000	0	9
10	Black	236,500	88,900	88,600	0	0	0	58,900	0	0	10
11	Hispanic	5,300	800	3,700	0	0	0	800	0	0	11
12	Non-Hispanic	231,200	84,500	88,600	0	0	0	58,100	0	0	12
13	American Indian or Alaska Native alone	16,400	800	13,800	0	0	0	1,700	0	0	13
14	Asian or Pacific Islander	106,800	24,500	56,200	0	0	0	26,100	0	0	14
16	Other	17,100	14,200	0	0	0	0	2,900	0	0	16
17	Hispanic or Latino (any race)	355,400	167,000	155,600	0	3,100	500	29,200	0	0	17

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
	Income sources of families and primary individuals										
18	Wages and salaries	1,240,500	870,700	144,300	0	2,300	500	221,700	1,000	0	18
20	Dividends, interest, or rent	318,100	147,100	104,900	0	0	0	66,000	0	0	20
21	Public assistance or public welfare	11,800	800	9,400	0	0	0	1,700	0	0	21

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

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
1	Occupied units	1,545,500	1,176,400	105,500	0	3,900	500	258,200	1,000	0	1
	Tenure										
2	Owner-occupied	950,800	693,400	75,800	0	2,300	0	179,200	0	0	2
3	Homeownership rate	61.5%									3
4	Renter-occupied	594,700	359,200	153,500	0	1,600	500	79,000	1,000	0	4
	Renter monthly housing costs										
5	No cash rent	19,100	2,000	15,400	0	0	0	1,700	0	0	5
6	Less than \$350	19,400	5,400	11,200	0	0	0	2,800	0	0	6
7	\$350 to \$599	63,200	30,000	27,600	0	0	500	5,100	0	0	7
8	\$600 to \$799	150,200	66,800	76,100	0	800	0	6,500	0	0	8
9	\$800 to \$1,249	232,200	69,700	133,900	0	800	0	26,800	1,000	0	9
10	\$1,250 or more	110,600	12,700	62,000	0	0	0	35,900	0	0	10
	Renter household income										
11	Less than \$15,000	133,700	21,000	97,500	0	1,600	500	13,100	0	0	11
12	\$15,000 to \$29,999	123,600	24,900	88,400	0	0	0	10,300	0	0	12
13	\$30,000 to \$49,999	135,000	34,900	85,900	0	0	0	13,800	400	0	13
14	\$50,000 to \$99,999	149,700	23,100	99,700	0	0	0	26,300	600	0	14
15	\$100,000 or more	52,700	4,300	33,000	0	0	0	15,400	0	0	15



	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 2002	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 2002 stock	2011 units added in other ways	Row
	Owner monthly housing costs										
16	Less than \$350	22,200	7,400	13,000	0	0	0	1,700	0	0	16
17	\$350 to \$599	100,900	19,800	73,700	0	800	0	6,700	0	0	17
18	\$600 to \$799	87,500	14,700	68,500	0	0	0	4,400	0	0	18
19	\$800 to \$1,249	190,800	47,000	123,200	0	1,500	0	19,100	0	0	19
20	\$1,250 or more	549,300	222,500	179,500	0	0	0	147,400	0	0	20
	Owner household income										
21	Less than \$15,000	70,100	7,700	54,200	0	0	0	8,100	0	0	21
22	\$15,000 to \$29,999	116,300	18,000	85,800	0	1,500	0	11,000	0	0	22
23	\$30,000 to \$49,999	148,600	30,600	100,700	0	800	0	16,600	0	0	23
24	\$50,000 to \$99,999	278,400	89,700	127,500	0	0	0	61,200	0	0	24
25	\$100,000 or more	337,500	125,300	129,900	0	0	0	82,400	0	0	25

**Forward-Looking Rental Dynamics Table 1: Counts, 2002–2011, Dallas**

Affordability categories	A Total in 2002	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	79,300	16,200	600	17,900	12,800	17,400	2,200	1,100	0	8,200	500	2,300
Extremely low rent	28,300	2,800	1,200	8,400	2,700	2,100	700	0	0	7,700	700	1,900
Very low rent	264,400	10,200	3,900	92,800	80,800	43,300	2,400	1,100	700	12,700	5,800	10,700
Low rent	83,900	2,700	0	6,600	16,200	45,400	4,600	1,000	0	5,600	500	1,300
Moderate rent	61,400	600	600	500	3,500	31,500	13,700	2,900	600	7,100	0	500
High rent	13,100	600	0	600	1,200	2,500	3,500	1,600	600	2,400	0	300
Very high rent	3,400	0	0	0	100	0	600	0	1,100	1,300	0	300
Extremely high rent	3,400	0	0	0	0	500	1,200	0	1,100	600	0	0
Total	537,200	33,100	6,300	126,800	117,300	142,700	28,900	7,700	4,100	45,600	7,500	17,300

**Forward-Looking Rental Dynamics Table 2: Row Percentages, 2002–2011, Dallas**

Affordability categories	A Total in 2002	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	79,300	20.5%	0.7%	22.6%	16.1%	22.0%	2.8%	1.4%	0.0%	10.3%	0.7%	2.9%
Extremely low rent	28,300	9.9%	4.3%	29.6%	9.6%	7.5%	2.5%	0.0%	0.0%	27.3%	2.5%	6.8%
Very low rent	264,400	3.8%	1.5%	35.1%	30.6%	16.4%	0.9%	0.4%	0.3%	4.8%	2.2%	4.0%
Low rent	83,900	3.2%	0.0%	7.9%	19.3%	54.1%	5.5%	1.2%	0.0%	6.7%	0.5%	1.6%
Moderate rent	61,400	1.0%	0.9%	0.7%	5.7%	51.3%	22.3%	4.8%	0.9%	11.5%	0.0%	0.9%
High rent	13,100	4.4%	0.0%	4.3%	9.1%	18.8%	26.6%	12.4%	4.5%	18.0%	0.0%	1.9%
Very high rent	3,400	0.0%	0.0%	0.0%	4.0%	0.0%	17.3%	0.0%	33.3%	37.7%	0.0%	7.7%
Extremely high rent	3,400	0.0%	0.0%	0.0%	0.0%	16.1%	34.3%	0.0%	32.7%	16.9%	0.0%	0.0%
Total	537,200	6.2%	1.2%	23.6%	21.8%	26.6%	5.4%	1.4%	0.8%	8.5%	1.4%	3.2%

**Backward-Looking Rental Dynamics Table 1: Counts, 2002–2011, Dallas**

Affordability categories	A Total in 2011	B Non-market in 2002	C Extremely low rent in 2002	D Very low rent in 2002	E Low rent in 2002	F Moderate rent in 2002	G High rent in 2002	H Very high rent in 2002	I Extremely high rent in 2002	J Owner-occupied in 2002	K Seasonal or related vacant in 2002	L New construction	M Added in other ways
Non-market	56,800	17,800	3,000	11,200	3,000	600	600	0	0	12,300	800	7,400	0
Extremely low rent	9,200	600	1,300	4,000	0	500	0	0	0	1,300	0	1,000	500
Very low rent	158,900	19,400	8,800	97,700	7,400	500	600	0	0	11,500	2,600	7,100	3,200
Low rent	143,600	13,700	2,900	82,000	17,300	3,500	1,300	100	0	14,900	1,300	5,900	600
Moderate rent	203,700	18,300	2,200	46,500	48,600	33,500	2,500	0	600	22,400	0	28,500	700
High rent	63,100	2,400	800	2,200	4,900	14,300	3,800	600	1,200	13,400	0	19,500	0
Very high rent	29,600	1,200	0	1,200	1,100	3,200	1,700	0	0	10,500	0	10,700	0
Extremely high rent	18,900	0	0	800	0	500	500	1,100	1,200	6,800	0	7,600	400
Total	683,900	73,500	19,100	245,400	82,300	56,700	11,000	1,800	3,100	93,100	4,800	87,700	5,500

**Backward-Looking Rental Dynamics Table 2: Row Percentages, 2002–2011, Dallas**

Affordability categories	A Total in 2011	B Non-market in 2002	C Extremely low rent in 2002	D Very low rent in 2002	E Low rent in 2002	F Moderate rent in 2002	G High rent in 2002	H Very high rent in 2002	I Extremely high rent in 2002	J Owner-occupied in 2002	K Seasonal or related vacant in 2002	L New construction	M Added in other ways
Non-market	56,800	31.4%	5.3%	19.7%	5.4%	1.1%	1.1%	0.0%	0.0%	21.6%	1.4%	13.1%	0.0%
Extremely low rent	9,200	6.8%	14.6%	43.2%	0.0%	5.5%	0.0%	0.0%	0.0%	14.6%	0.0%	10.4%	5.0%
Very low rent	158,900	12.2%	5.6%	61.5%	4.7%	0.3%	0.4%	0.0%	0.0%	7.2%	1.7%	4.5%	2.0%
Low rent	143,600	9.6%	2.0%	57.1%	12.0%	2.5%	0.9%	0.1%	0.0%	10.4%	0.9%	4.1%	0.4%
Moderate rent	203,700	9.0%	1.1%	22.8%	23.9%	16.5%	1.2%	0.0%	0.3%	11.0%	0.0%	14.0%	0.4%
High rent	63,100	3.8%	1.2%	3.4%	7.8%	22.7%	6.0%	1.0%	2.0%	21.2%	0.0%	30.9%	0.0%
Very high rent	29,600	4.2%	0.0%	4.0%	3.6%	10.8%	5.6%	0.0%	0.0%	35.6%	0.0%	36.3%	0.0%
Extremely high rent	18,900	0.0%	0.0%	4.2%	0.0%	2.8%	2.7%	5.7%	6.6%	36.1%	0.0%	39.9%	2.2%
Total	683,900	10.7%	2.8%	35.9%	12.0%	8.3%	1.6%	0.3%	0.5%	13.6%	0.7%	12.8%	0.8%