American Housing Survey

Components of Inventory Change and Rental Dynamics Analysis: Fort Worth, 2002–2011

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Executive Summary

Components of Inventory Change (CINCH) is a tool used by housing analysts to study how the housing inventory changes over time. One typically thinks of the housing stock as evolving through two mechanisms—the construction of new units and the demolition of old units. While new construction and losses through demolition and natural disasters are the primary means by which the housing stock changes, CINCH shows that there are other important engines of change.

This report describes how the housing stock in the Fort Worth 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 Fort Worth and on their occupants in both 2002 and 2011.

In 2002 the Fort Worth metropolitan area contained 639,400 housing units, including vacant units. By 2011 the number of housing units had increased to 856,200. Part of this increase was due to a redefinition of the metropolitan area that added Parker and Wise Counties. We estimate that the 2011 count of housing units for the metropolitan area as defined in 2002 would be 786,500. This represents an overall increase of 23.0 percent, which translates to an average annual increase of 2.3 percent over the 9-year period.

Between 2002 and 2011, only 6,900 units left the housing stock. Of these, 5,200 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 1,200 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 500 units that left the housing stock either permanently or temporarily for "other" reasons, a category that encompasses a wide variety of situations. Demolitions and natural disasters accounted for 5,000 of the permanent losses, while mergers and conversions contributed another 100 permanent losses.

In the period between the 2002 and the 2011 AHS surveys, 167,500 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 Fort Worth, a factor that contributed 1,900 units. No units were formed from the conversion or merger of 2002 units. We classified 3,200 units as recovered because these units had been in the housing stock at some point but were classified in 2002 as nonresidential (700) or uninhabitable (2,500). Finally, no units were added in other unclassified ways.

The Fort Worth metropolitan area lost 1.1 percent of all 2002 housing units by 2011; additions between 2002 and 2011 represented 19.6 percent of the 2011 housing stock. Losses and additions varied across portions of the Fort Worth 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:

- Smaller units (3 rooms or 1 bedroom) experienced high loss rates, whereas larger units (7 rooms or 3 or more bedrooms) had lower rates.

- 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 (less than $600) and those occupied by low-income households (less than $15,000) had very 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. An interesting anomaly is that owner-occupied units with very low monthly housing costs (less than $350) also had a very low loss rate.

- The rate of addition was high among both single-family detached and single-family attached units.

- Overall, units in multifamily structures experienced low rates of addition, and this was particularly the case among units in small multifamily structures (2–4 units, 5–9 units, 10–19 units, and 1 or 2 stories).

- 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, moderate physical problems, heating problems, and upkeep problems.

- Units with older (65 years or older) householders in 2011 had low rates of addition, whereas those with householders younger than 65 had a higher rate of addition. Units with children in 2011 had a higher-than-average rate, while those without children had a lower-than-average rate.

- Units with Hispanic householders in 2011 had low rates of addition.

- 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 less than $800 or with households earning $15,000 to $49,999 had low rates of addition. The rate of addition was higher than average among rental units with monthly housing costs of $1,250 or more. The very high rate of addition among no-cash-rent units was an anomaly.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units. 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 $100,000 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 Fort Worth was affordable. Of the 222,800 rental units in 2002, 123,800 were extremely low rent or very low rent units. In addition, 36,600 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 72.0 percent of the 2002 rental stock. The three highest rent categories comprised only 3.5 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—42.6 percent of all 2002 units compared to 8.3 percent. By 2011, 13.8 percent of the 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 Fort Worth was less affordable in 2011 than in 2002. Of the 321,600 rental units in 2011, 94,600 were extremely low rent or very low rent units. In addition, 33,200 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 39.7 percent of the 2011 rental stock. The three highest rent categories comprised 9.6 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—32.1 percent of all 2011 units compared to 6.4 percent. Of the rental units in 2011, 33.9 percent were not rental in 2002. The largest proportion of these gains was due to changes in tenure.

Components of Inventory Change and Rental Dynamics Analysis: Fort Worth, 2002–2011

1. Introduction

This report describes how the housing stock in the Fort Worth 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 Fort Worth and on their occupants in both 2002 and 2011.[1]

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. [2]

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). [3] 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 Fort Worth.
- 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.

[1] 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.

[2] 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.

[3] 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 Fort Worth 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: Fort Worth

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 Fort Worth metropolitan area contained 639,400 housing units, including vacant units. By 2011 the number of housing units had increased to 856,200. Part of this increase was due to a redefinition of the metropolitan areas that added Parker and Wise 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 786,500. This represents an overall increase of 23.0 percent, which translates to an average annual increase of 2.3 percent over the 9-year period.

The change in the geographical definition of Fort Worth 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 Fort Worth 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 2,373 sample units that were common to the 2002 and 2011 AHS Fort Worth surveys and satisfied all the analytical requirements.[4] Between 2002 and 2011, 53 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 2,426 sample units. Between 2002 and 2011, 576 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 2,949 sample units. In the forward-looking analysis, the average weight of a sample unit is approximately 264 units; in the backward-looking analysis, the average weight of a sample unit is approximately 290 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 Fort Worth, 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.

[4] The 2002 AHS surveyed 5,052 units in the Fort Worth metropolitan area; 3,113 of these units were in the 2011 AHS public use file (PUF). Of the 1,939 sample units no longer in the survey, 730 were legitimate temporary or permanent losses to the housing stock and were considered for the analysis. The remaining 1,209 cases are coded as "sample reduction for the current survey year" with no further explanation.

Table 1 reports that, between 2002 and 2011, only 6,900 units left the housing stock.[5] Of these, 5,200 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 1,200 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 500 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 Fort Worth Housing Units in 2011[6]

Present in 2002	639,400
2002 units present in 2011	632,500
Units no longer in the stock	**6,900**
2002 units lost due to conversion/merger	100
2002 house or mobile home moved out	0
2002 units lost through demolition or disaster	5,000
Permanent losses	**5,200**
2002 units changed to nonresidential use	200
2002 units badly damaged or condemned	1,100
Temporary losses	**1,200**
2002 units lost in other ways	**500**

Demolitions and natural disasters accounted for 5,000 of the permanent losses, while mergers and conversions contributed another 100 permanent losses. "Conversion" is the terminology used in the AHS for the splitting of a unit into two or more units. The movement of a mobile home or house is considered a permanent loss because a housing unit is the combination of land and capital. While movement preserves the capital, it dissolves the union of capital and land that formed the original unit; therefore, the movement of a mobile home is considered a permanent loss. Unfortunately, the 2011 AHS survey in Fort Worth did not track mobile home move-outs, probably because the long time between surveys makes it difficult to determine whether the current mobile home was the same mobile home as in 2002.

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.

[5] 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.

[6] 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.[7]

Table 2: Sources for 2011 Fort Worth Housing Stock[8]

2011 housing stock	856,300
2011 units present in 2002	688,800
Total additions to stock	**167,500**
Units added by new construction	162,400
House or mobile home moved in	1,900
Units added by conversion/merger	0
New or reconstructed units	**164,300**
Units added from nonresidential use	700
Units added from temporary losses	2,500
Recovered units	**3,200**
Units added in other ways	**0**

In the period between the 2002 and the 2011 AHS surveys, 167,500 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 Fort Worth, a factor that contributed 1,900 units. No units were formed from the conversion or merger of 2002 units.

We classified 3,200 units as recovered because these units had been in the housing stock at some point but were classified in 2002 as nonresidential (700) or uninhabitable (2,500). Finally, no 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 Fort Worth metropolitan area lost 1.1 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 1.0 percent of its units between 2002 and 2011.

[7] 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.

[8] Numbers may not add consistently due to rounding. Counts were rounded to the nearest hundred.

We examined all of the components of the 2002 Fort Worth 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 Fort Worth, 2002–2011[9]

Characteristics	Present in 2002	Total lost	Percent lost
Housing stock	639,400	6,900	1.1%
Occupancy status			
Occupied	585,900	5,800	1.0%
Vacant	51,700	1,100	2.1%
Rooms			
3	60,200	1,700	2.7%*
7	70,800	200	0.3%*
Bedrooms			
1	90,500	2,500	2.8%**
3	289,800	1,200	0.4%**
4 or more	110,100	300	0.3%**
Tenure			
Owner-occupied	392,800	1,600	0.4%**
Renter-occupied	193,100	4,200	2.2%**
Renter monthly housing costs			
Less than $350	19,400	1,000	5.2%*
$350 to $599	58,900	2,100	3.6%**
Renter household income			
Less than $15,000	44,000	2,200	5.0%**
Owner monthly housing costs			
Less than $350	76,100	200	0.3%*
$1,250 or more	103,600	200	0.2%***
Owner household income			
$50,000 to $99,999	147,100	300	0.2%***
$100,000 or more	84,500	400	0.5%***

*Statistically different from either all units or all occupied units, as appropriate, at the 10-percent level.
**Statistically different from either all units or all occupied units, as appropriate, at the 5-percent level.
*** Statistically different from either all units or all occupied units, as appropriate, at the 1-percent level.

[9] 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.

- Smaller units (3 rooms or 1 bedroom) experienced high loss rates, whereas larger units (7 rooms or 3 or more bedrooms) had lower rates.

- 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 (less than $600) and those occupied by low-income households (less than $15,000) had very 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. An interesting anomaly is that owner-occupied units with very low monthly housing costs (less than $350) also had a very low loss rate.

The 167,500 additions reported in Table 2 represented 19.6 percent of the 2011 housing stock. The rates of addition varied by the characteristics of the housing. Additions represented 19.8 percent of occupied units.

We examined all of the components of the 2002 Fort Worth 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 Fort Worth, 2002–2011[10]

Characteristics	Present in 2011	Total additions	Percent additions
Housing stock	856,300	167,500	19.6%
Occupancy status			
Occupied	789,400	156,300	19.8%
Vacant	64,500	11,000	17.1%
Units in structure			
1, detached	592,000	129,800	21.9%**
1, attached	37,200	14,600	39.2%***
2 to 4	42,100	1,700	4.0%***
5 to 9	55,400	3,100	5.6%***
10 to 19	58,500	5,700	9.8%***
Rooms			
3	78,200	9,100	11.6%***
4	121,000	14,000	11.6%***
5	209,000	30,700	14.7%***
6	191,900	30,700	16.0%**
7	110,900	28,000	25.3%**
8	73,500	28,300	38.5%***
9	38,700	13,000	33.5%***
10 or more	29,600	13,700	46.2%***
Bedrooms			
1	109,500	13,400	12.2%***
2	165,400	15,800	9.5%***
4 or more	196,400	69,600	35.4%***
Multiunit structures	189,500	16,500	8.7%***
Stories in structure			
1	27,100	900	3.2%***
2	116,000	4,300	3.7%***
Lacking complete kitchen facilities	12,400	300	2.6%***
Lacking some plumbing	5,700	300	5.7%***
Severe problems	12,000	300	2.7%***
Plumbing	5,700	300	5.7%***
Moderate problems	36,537	909	2.5%***
Kitchen	12,400	300	2.6%***
Upkeep	8,600	600	6.9%***
Age of householder			
Under 65	660,300	145,300	22.0%*
65 to 74	72,800	8,600	11.9%***
75 or older	56,300	2,300	4.1%***
Children in household			
Some	293,800	73,400	25.0%***
None	495,600	82,800	16.7%***

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

Characteristics	Present in 2011	Total additions	Percent additions
Race and ethnicity			
White Hispanic	164,500	23,300	14.2%***
Hispanic or Latino (any race)	172,200	24,200	14.0%***
Tenure			
Owner-occupied	503,500	113,100	22.5%**
Renter-occupied	285,900	43,200	15.1%***
Renter monthly housing costs			
No cash rent	8,100	3,200	39.1%***
Less than $350	16,000	1,600	9.7%**
$350 to $599	35,400	500	1.5%***
$600 to $799	72,000	5,200	7.3%***
$1,250 or more	43,100	13,200	30.6%***
Renter household income			
$15,000 to $29,999	59,000	5,700	9.6%***
$30,000 to $49,999	79,400	8,100	10.2%***
Owner monthly housing costs			
Less than $350	18,099	1,053	5.8%***
$350 to $599	77,372	3,352	4.3%***
$600 to $799	54,157	4,636	8.6%***
$800 to $1,249	115,026	18,409	16.0%*
$1,250 or more	238,846	85,676	35.9%***
Owner household income			
$15,000 to $29,999	42,100	5,900	13.9%*
$30,000 to $49,999	72,500	7,100	9.8%***
$50,000 to $99,999	93,300	12,500	13.4%***
$100,000 or more	167,700	42,000	25.0%***

*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 Fort Worth metropolitan area.

- The rate of addition was high among both single-family detached and single-family attached units.

- Overall, units in multifamily structures experienced low rates of addition, and this was particularly the case among units in small multifamily structures (2–4 units, 5–9 units, 10–19 units, and 1 or 2 stories).

- 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, moderate physical problems, heating problems, and upkeep problems.

- Units with older (65 years or older) householders in 2011 had low rates of addition, whereas those with householders younger than 65 had a higher rate of addition. Units with children in 2011 had a higher-than-average rate, while those without children had a lower-than-average rate.

- Units with Hispanic householders in 2011 had low rates of addition.

- 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 less than $800 or with households earning $15,000 to $49,999 had low rates of addition. The rate of addition was higher than average among rental units with monthly housing costs of $1,250 or more. The very high rate of addition among no-cash-rent units was an anomaly.

- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units. 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 $100,000 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.[11] 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 Fort Worth

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	36,600	NA	30.4%	56.6%	13.0%
Extremely low rent	14,900	10.9%	6.4%	58.5%	24.3%
Very low rent	108,900	6.0%	42.2%	40.3%	11.5%
Low rent	36,500	11.9%	22.3%	52.0%	13.7%
Moderate rent	18,100	10.7%	60.2%	11.0%	18.1%
High rent	2,800	18.3%	28.6%	12.8%	40.2%
Very high rent	2,500	72.8%	8.9%	10.2%	8.1%
Extremely high rent	2,500	71.4%	21.3%	NA	7.3%
Total	222,800	8.3%	35.3%	42.6%	13.8%

The 2002 rental stock in Fort Worth was affordable. Of the 222,800 rental units in 2002, 123,800 were extremely low rent or very low rent units. In addition, 36,600 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 72.0 percent of the 2002 rental stock. The three highest rent categories comprised only 3.5 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—42.6 percent of all 2002 units compared to 8.3 percent.

By 2011, 13.8 percent of the 222,800 rental units in 2002 were no longer in the rental stock (30,700 units). The largest proportion of these losses was due to changes in tenure, with 20,700 rental units becoming owner-occupied or vacant for sale in 2011. Another 5,300 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 4,800 rental units were no longer in the housing stock in 2011. Some of these losses were permanent; that is, the units were demolished or destroyed. Some losses were potentially reversible, such as units being used for nonresidential purposes. Forward-

[11] Gross rent is equal to rent plus utilities.

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 Fort Worth was less affordable in 2011 than in 2002. Of the 321,600 rental units in 2011, 94,600 were extremely low rent or very low rent units. In addition, 33,200 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 39.7 percent of the 2011 rental stock. The three highest rent categories comprised 9.6 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—32.1 percent of all 2011 units compared to 6.4 percent.

Table 6: Summary of Backward-Looking Rental Dynamics for Fort Worth

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	33,200	NA	37.1%	25.4%	37.5%
Extremely low rent	8,100	18.3%	12.2%	35.5%	34.0%
Very low rent	86,500	15.4%	59.9%	4.9%	19.8%
Low rent	67,000	59.0%	14.5%	2.2%	24.3%
Moderate rent	95,700	44.0%	12.7%	1.4%	41.9%
High rent	21,900	20.1%	3.9%	8.5%	67.5%
Very high rent	4,500	14.7%	8.0%	10.6%	66.7%
Extremely high rent	4,600	38.7%	9.4%	NA	51.9%
Total	321,600	32.1%	27.6%	6.4%	33.9%

Of the 321,600 rental units in 2011, 33.9 percent were not rental in 2002 (108,900 units). The largest proportion of these gains was due to changes in tenure, with 55,500 rental units having been owner-occupied or vacant for sale in 2002. Another 5,100 units had been seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 48,300 rental units had not been in the housing stock in 2002. Of these, 44,000 were added by new construction and 4,300 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: Fort Worth Metropolitan Area, 2002–2011

In 2002 the Fort Worth metropolitan area contained 639,400 housing units, including vacant units. By 2011 the number of housing units had increased to 856,200. Part of this increase was due to a redefinition of the metropolitan areas that added Parker and Wise 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 786,500. This

represents an overall increase of 23.0 percent, which translates to an average annual increase of 2.3 percent over the 9-year period.

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

Between 2002 and 2011, only 6,900 units left the housing stock.[12] Of these, 5,200 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 1,200 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 500 units that left the housing stock either permanently or temporarily for "other" reasons, a category that encompasses a wide variety of situations. Demolitions and natural disasters accounted for 5,000 of the permanent losses, while mergers and conversions contributed another 100 permanent losses. The 2011 AHS survey in Fort Worth did not track mobile home move-outs.

In the period between the 2002 and the 2011 AHS surveys, 167,500 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 Fort Worth, a factor that contributed 1,900 units. No units were formed from the conversion or merger of 2002 units. We classified 3,200 units as recovered because these units had been in the housing stock at some point but were classified in 2002 as nonresidential (700) or uninhabitable (2,500). Finally, no units were added in other unclassified ways.

The Fort Worth metropolitan area lost 1.1 percent of all 2002 housing units by 2011; additions between 2002 and 2011 represented 19.6 percent of the 2011 housing stock. Losses and additions varied across portions of the Fort Worth 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:

- Smaller units (3 rooms or 1 bedroom) experienced high loss rates, whereas larger units (7 rooms or 3 or more bedrooms) had lower rates.

- 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 (less than $600) and those occupied by low-income households (less than $15,000) had very 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

[12] 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.

low loss rates. An interesting anomaly is that owner-occupied units with very low monthly housing costs (less than $350) also had a very low loss rate.

- The rate of addition was high among both single-family detached and single-family attached units.

- Overall, units in multifamily structures experienced low rates of addition, and this was particularly the case among units in small multifamily structures (2–4 units, 5–9 units, 10–19 units, and 1 or 2 stories).

- 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, moderate physical problems, heating problems, and upkeep problems.

- Units with older (65 years or older) householders in 2011 had low rates of addition, whereas those with householders younger than 65 had a higher rate of addition. Units with children in 2011 had a higher-than-average rate, while those without children had a lower-than-average rate.

- Units with Hispanic householders in 2011 had low rates of addition.

- 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 less than $800 or with households earning $15,000 to $49,999 had low rates of addition. The rate of addition was higher than average among rental units with monthly housing costs of $1,250 or more. The very high rate of addition among no-cash-rent units was an anomaly.

- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units. 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 $100,000 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 Fort Worth was affordable. Of the 222,800 rental units in 2002, 123,800 were extremely low rent or very low rent units. In addition, 36,600 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 72.0 percent of the 2002 rental stock. The three highest rent categories comprised only 3.5 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded

moves to a more affordable category (sometimes called filtration)—42.6 percent of all 2002 units compared to 8.3 percent. By 2011, 13.8 percent of the 222,800 rental units in 2002 were no longer in the rental stock (30,700 units). The largest proportion of these losses was due to changes in tenure, with 20,700 rental units becoming owner-occupied or vacant for sale in 2011.

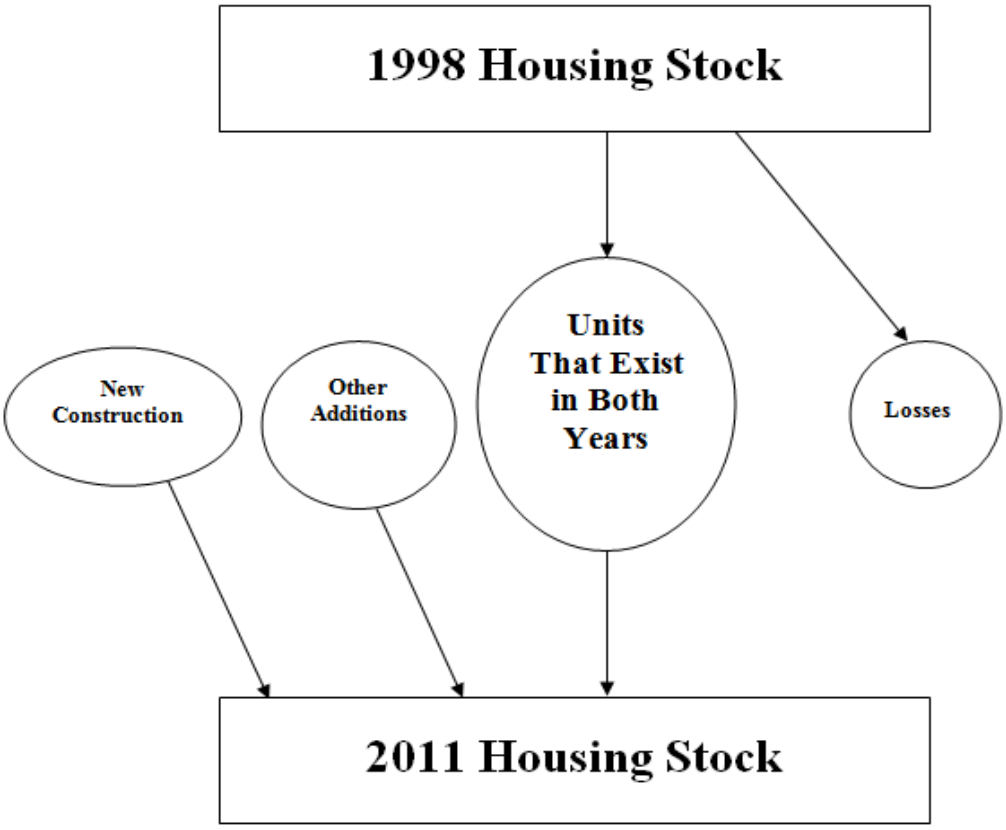
The rental stock in Fort Worth was less affordable in 2011 than in 2002. Of the 321,600 rental units in 2011, 94,600 were extremely low rent or very low rent units. In addition, 33,200 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 39.7 percent of the 2011 rental stock. The three highest rent categories comprised 9.6 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—32.1 percent of all 2011 units compared to 6.4 percent. Of the 321,600 rental units in 2011, 33.9 percent were not rental in 2002 (108,900 units). The largest proportion of these gains was due to changes in tenure, with 55,500 rental units having been owner-occupied or vacant for sale in 2002.

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:[13]

- 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.

[13] 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.[14] 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.

[14] 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.[15]

- 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.[16]

- 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

[15] 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.

[16] 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 substation 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.[17]

- 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.

[17] 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, Fort Worth

	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	639,400	632,500	0	100	0	200	5,000	1,100	500	1
	Occupancy status										
2	Occupied	585,900	524,700	55,400	100	0	0	4,500	1,000	200	2
3	Vacant	51,700	10,500	40,200	0	0	200	600	100	200	3
4	Seasonal	1,800	0	1,800	0	0	0	0	0	0	4
	Units in structure										
5	1, detached	429,700	426,200	0	100	0	0	2,600	500	200	5
6	1, attached	64,100	62,900	0	0	0	200	900	100	100	6
7	2 to 4	25,000	24,500	0	0	0	0	300	200	0	7
8	5 to 9	31,500	31,100	0	0	0	0	400	0	0	8
9	10 to 19	41,000	40,400	0	0	0	0	500	100	0	9
10	20 to 49	16,000	15,600	0	0	0	0	100	100	100	10
11	50 or more	3,500	3,400	0	0	0	0	100	0	0	11
12	Manufactured/mobile home	28,500	28,500	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	34,500	34,400	0	0	0	0	0	0	100	15
16	1995–1999	49,500	49,200	0	0	0	200	200	0	0	16
17	1990–1994	35,800	35,600	0	0	0	0	200	0	0	17
18	1985–1989	76,100	76,100	0	0	0	0	0	0	0	18
19	1980–1984	107,100	107,100	0	0	0	0	0	0	0	19
20	1975–1979	57,200	57,200	0	0	0	0	0	0	0	20
21	1970–1974	57,600	56,600	0	0	0	0	1,000	0	0	21
22	1960–1969	82,100	79,700	0	0	0	0	2,000	100	200	22
23	1950–1959	65,900	65,000	0	0	0	0	400	400	0	23
24	1940–1949	39,900	38,800	0	0	0	0	700	300	100	24
25	1930–1939	22,800	22,500	0	100	0	0	200	0	0	25
26	1920–1929	7,500	7,100	0	0	0	0	400	0	0	26
27	1919 or earlier	3,500	3,300	0	0	0	0	0	200	0	27
	Rooms										
28	1	400	0	400	0	0	0	0	0	0	28
29	2	4,500	500	3,400	0	0	0	400	0	100	29
30	3	60,200	41,100	17,400	0	0	200	1,400	0	100	30
31	4	103,800	52,000	49,900	0	0	0	1,400	600	0	31
32	5	168,000	90,400	76,200	0	0	0	1,000	200	100	32
33	6	144,700	73,400	70,500	100	0	0	300	300	100	33
34	7	70,800	28,900	41,700	0	0	0	200	0	0	34
35	8	45,900	16,700	29,200	0	0	0	0	0	0	35
36	9	22,900	9,400	13,500	0	0	0	0	0	0	36
37	10 or more	18,200	8,700	9,200	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	2,500	800	1,600	0	0	0	200	0	0	38
39	1	90,500	79,600	8,300	0	0	200	2,200	0	200	39
40	2	146,500	119,800	24,000	0	0	0	1,400	1,100	100	40
41	3	289,800	258,100	30,500	100	0	0	1,100	0	0	41
42	4 or more	110,100	95,600	14,200	0	0	0	200	0	100	42
43	Multiunit structures	117,000	114,900	0	0	0	0	1,500	400	100	43
	Stories in structure										
44	1	13,400	13,200	0	0	0	0	0	200	0	44
45	2	74,200	72,400	0	0	0	0	1,500	200	0	45
46	3	28,300	28,100	0	0	0	0	0	0	100	46
47	4 tor more	1,200	1,200	0	0	0	0	0	0	0	47

Forward-Looking Table B: Unit Quality, Fort Worth

	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	585,900	524,700	55,400	100	0	0	4,500	1,000	200	1
2	With complete kitchen	575,600	508,800	61,200	100	0	0	4,200	1,000	200	2
3	Lacking complete kitchen facilities	10,300	900	9,200	0	0	0	300	0	0	3
4	With complete plumbing	581,000	516,400	59,100	100	0	0	4,200	1,000	200	4
5	Lack some plumbing	4,900	0	4,600	0	0	0	300	0	0	5
6	No hot piped water	1,000	0	900	0	0	0	200	0	0	6
7	No bathtub/shower	400	0	200	0	0	0	200	0	0	7
8	No flush toilet	400	0	200	0	0	0	200	0	0	8
9	No exclusive use	3,700	0	3,600	0	0	0	100	0	0	9
	Water										
10	Public/private water	579,900	519,800	54,400	100	0	0	4,300	1,000	200	10
11	Well serving 1 to 5 units	6,000	3,300	2,600	0	0	0	100	0	0	11
12	Other water source										12
	Sewer										
13	Public sewer	553,500	498,900	49,700	100	0	0	3,800	700	200	13
14	Septic tank/cesspool	32,400	21,800	9,600	0	0	0	600	300	0	14
15	Other										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	8,700	1,100	7,200	0	0	0	300	100	0	16
17	Plumbing	4,900	0	4,600	0	0	0	300	0	0	17
18	Heating	3,200	900	2,300	0	0	0	0	100	0	18
19	Electric	200	0	0	0	0	0	200	0	0	19
20	Upkeep	700	0	700	0	0	0	0	0	0	20
21	Moderate problems	41,500	14,500	26,000	100	0	0	700	100	0	21
22	Plumbing	2,000	0	2,000	0	0	0	0	0	0	22
23	Heating	23,400	14,000	8,600	100	0	0	500	100	0	23
24	Kitchen	10,300	900	9,200	0	0	0	300	0	0	24
25	Upkeep	11,900	600	11,100	0	0	0	100	100	0	25

Forward-Looking Table C: Occupant Characteristics, Fort Worth

	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	585,900	524,700	55,400	100	0	0	4,500	1,000	200	1
	Age of householder										
2	Under 65	495,500	387,000	103,100	100	0	0	4,000	1,000	200	2
3	65 to 74	48,700	6,800	41,900	0	0	0	0	0	0	3
4	75 or older	41,700	17,500	23,700	0	0	0	500	0	0	4
	Children in household										
5	Some	254,200	115,600	136,100	100	0	0	1,900	400	100	5
6	None	331,700	232,900	95,500	0	0	0	2,600	600	100	6
	Race and ethnicity										
7	White	445,100	362,400	78,800	100	0	0	2,900	800	100	7
8	Hispanic	51,400	36,600	14,200	0	0	0	600	100	0	8
9	Non-Hispanic	393,700	278,100	112,400	100	0	0	2,300	700	100	9
10	Black	70,400	40,900	28,600	0	0	0	900	100	0	10
11	Hispanic	800	0	500	0	0	0	200	0	0	11
12	Non-Hispanic	69,700	39,600	29,300	0	0	0	700	100	0	12
13	American Indian or Alaska Native alone	2,100	0	2,100	0	0	0	0	0	0	13
14	Asian or Pacific Islander	17,200	8,000	9,000	0	0	0	200	0	0	14
16	Other	51,100	200	50,200	0	0	0	500	100	100	16
17	Hispanic or Latino (any race)	94,800	61,900	31,400	0	0	0	1,200	200	100	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	501,000	363,600	133,200	100	0	0	3,200	800	100	18
20	Dividends, interest, or rent	158,700	56,400	101,100	0	0	0	1,000	200	0	20
21	Public assistance or public welfare	17,100	600	16,400	0	0	0	0	100	0	21

Forward-Looking Table D: Income and Housing Cost, Fort Worth

	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	585,900	524,700	55,400	100	0	0	4,500	1,000	200	1
	Tenure										
2	Owner-occupied	392,800	323,600	67,600	0	0	0	1,200	300	100	2
3	Homeownership rate	67.0%									3
4	Renter-occupied	193,100	140,300	48,600	100	0	0	3,300	700	100	4
	Renter monthly housing costs										
5	No cash rent	4,100	900	2,900	0	0	0	200	0	0	5
6	Less than $350	19,400	9,100	9,300	100	0	0	900	0	0	6
7	$350 to $599	58,900	15,400	41,400	0	0	0	1,400	600	100	7
8	$600 to $799	62,200	21,200	40,300	0	0	0	500	100	0	8
9	$800 to $1,249	40,600	21,600	18,700	0	0	0	200	0	0	9
10	$1,250 or more	8,000	4,000	4,000	0	0	0	0	0	0	10
	Renter household income										
11	Less than $15,000	44,000	15,200	26,600	0	0	0	1,700	400	100	11
12	$15,000 to $29,999	56,100	14,600	40,400	100	0	0	800	100	0	12
13	$30,000 to $49,999	48,100	12,500	34,800	0	0	0	600	200	0	13
14	$50,000 to $99,999	37,900	6,200	31,600	0	0	0	100	0	0	14
15	$100,000 or more	7,000	500	6,600	0	0	0	0	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
	Owner monthly housing costs										
16	Less than $350	76,100	7,700	68,200	0	0	0	200	0	0	16
17	$350 to $599	69,700	14,300	54,800	0	0	0	200	300	0	17
18	$600 to $799	48,300	7,600	40,700	0	0	0	0	0	0	18
19	$800 to $1,249	95,100	26,300	68,100	0	0	0	600	0	100	19
20	$1,250 or more	103,600	68,900	34,500	0	0	0	200	0	0	20
	Owner household income										
21	Less than $15,000	36,600	7,600	29,000	0	0	0	0	0	0	21
22	$15,000 to $29,999	49,700	13,600	35,500	0	0	0	500	0	100	22
23	$30,000 to $49,999	75,000	20,300	54,400	0	0	0	0	300	0	23
24	$50,000 to $99,999	147,100	51,900	94,900	0	0	0	300	0	0	24
25	$100,000 or more	84,500	33,700	50,400	0	0	0	400	0	0	25

Backward-Looking Table A: Housing Characteristics, Fort Worth

	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	856,300	688,800	0	0	1,900	700	162,400	2,500	856,300	1
	Occupancy status										
2	Occupied	789,400	581,400	51,700	0	1,100	300	152,500	2,400	789,400	2
3	Vacant	64,500	9,500	44,000	0	900	400	9,700	100	64,500	3
4	Seasonal	2,400	0	2,200	0	0	0	200	0	2,400	4
	Units in structure										
5	1, detached	592,000	462,200	0	0	0	700	129,000	100	592,000	5
6	1, attached	37,200	22,700	0	0	0	0	14,600	0	37,200	6
7	2 to 4	42,100	40,400	0	0	0	0	1,500	200	42,100	7
8	5 to 9	55,400	52,200	0	0	0	0	3,100	0	55,400	8
9	10 to 19	58,500	52,800	0	0	0	0	5,500	200	58,500	9
10	20 to 49	27,900	22,700	0	0	0	0	5,100	0	27,900	10
11	50 or more	5,700	4,800	0	0	0	0	900	0	5,700	11
12	Manufactured/mobile home	37,500	30,900	0	0	1,900	0	2,700	2,000	37,500	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	10,300	0	0	0	0	0	10,300	0	10,300	13
14	2005–2009	106,300	0	0	0	0	0	106,300	0	106,300	14
15	2000–2004	77,000	37,300	0	0	0	0	39,800	0	77,000	15
16	1995–1999	58,500	52,800	0	0	0	0	5,700	0	58,500	16
17	1990–1994	39,800	39,600	0	0	0	0	300	0	39,800	17
18	1985–1989	85,200	83,500	0	0	400	0	0	1,300	85,200	18
19	1980–1984	117,800	117,400	0	0	0	0	0	400	117,800	19
20	1975–1979	62,400	62,400	0	0	0	0	0	0	62,400	20
21	1970–1974	63,100	61,600	0	0	1,600	0	0	0	63,100	21
22	1960–1969	87,300	86,400	0	0	0	300	0	700	87,300	22
23	1950–1959	70,700	70,500	0	0	0	200	0	0	70,700	23
24	1940–1949	42,400	42,100	0	0	0	300	0	0	42,400	24
25	1930–1939	24,600	24,500	0	0	0	0	0	100	24,600	25
26	1920–1929	7,200	7,200	0	0	0	0	0	0	7,200	26
27	1919 or earlier	3,500	3,500	0	0	0	0	0	0	3,500	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	600	0	600	0	0	0	0	0	600	28
29	2	3,100	700	2,300	0	0	0	0	0	3,100	29
30	3	78,200	45,900	23,300	0	0	0	9,100	0	78,200	30
31	4	121,000	57,100	49,800	0	900	200	12,800	200	121,000	31
32	5	209,000	98,200	80,000	0	300	400	27,800	2,200	209,000	32
33	6	191,900	79,500	81,600	0	700	200	29,800	100	191,900	33
34	7	110,900	31,500	51,300	0	0	0	28,000	0	110,900	34
35	8	73,500	18,100	27,100	0	0	0	28,300	0	73,500	35
36	9	38,700	10,300	15,400	0	0	0	13,000	0	38,700	36
37	10 or more	29,600	9,500	6,400	0	0	0	13,700	0	29,600	37
	Bedrooms										
38	None	2,700	400	2,000	0	0	300	0	0	2,700	38
39	1	109,500	89,500	6,600	0	0	0	13,400	0	109,500	39
40	2	165,400	131,000	18,700	0	900	300	14,200	400	165,400	40
41	3	382,200	278,800	34,900	0	1,100	0	65,300	2,100	382,200	41
42	4 or more	196,400	104,800	22,100	0	0	200	69,400	0	196,400	42
43	Multiunit structures	189,500	173,000	0	0	0	0	16,100	400	189,500	43
	Stories in structure										
44	1	27,100	26,300	0	0	0	0	700	200	27,100	44
45	2	116,000	111,800	0	0	0	0	4,100	200	116,000	45
46	3	43,700	32,600	0	0	0	0	11,100	0	43,700	46
47	4 to 6	1,400	1,000	0	0	0	0	300	0	1,400	47
48	7 or more	1,300	1,300	0	0	0	0	0	0	1,300	48

Backward-Looking Table B: Unit Quality, Fort Worth

	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	789,400	581,400	51,700	0	1,100	300	152,500	2,400	789,400	1
2	With complete kitchen	777,000	562,900	58,100	0	1,100	300	152,200	2,400	777,000	2
3	Lacking complete kitchen facilities	12,400	1,000	11,100	0	0	0	300	0	12,400	3
4	With complete plumbing	783,700	572,400	55,400	0	1,100	300	152,200	2,400	783,700	4
5	Lack some plumbing	5,700	0	5,300	0	0	0	300	0	5,700	5
6	No hot piped water	1,500	0	1,500	0	0	0	0	0	1,500	6
7	No bathtub/shower	600	0	600	0	0	0	0	0	600	7
8	No flush toilet	900	0	900	0	0	0	0	0	900	8
9	No exclusive use	3,600	0	3,300	0	0	0	300	0	3,600	9
	Water										
10	Public/private water	780,000	576,400	53,400	0	1,100	300	146,400	2,400	780,000	10
11	Well serving 1 to 5 units	9,400	3,100	200	0	0	0	6,100	0	9,400	11
12	Other water source										12
	Sewer										
13	Public sewer	752,400	552,600	53,500	0	1,100	300	143,800	1,100	752,400	13
14	Septic tank/cesspool	37,000	24,300	2,700	0	0	0	8,700	1,300	37,000	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	12,000	1,200	10,500	0	0	0	300	0	12,000	16
17	Plumbing	5,700	0	5,300	0	0	0	300	0	5,700	17
18	Heating	5,400	1,000	4,500	0	0	0	0	0	5,400	18
19	Electric	300	0	300	0	0	0	0	0	300	19
20	Upkeep	1,100	0	1,100	0	0	0	0	0	1,100	20
21	Moderate problems	36,500	16,200	19,400	0	0	0	900	0	36,500	21
22	Plumbing	3,400	0	3,400	0	0	0	0	0	3,400	22
23	Heating	18,200	15,300	2,900	0	0	0	0	0	18,200	23
24	Kitchen	12,400	1,000	11,100	0	0	0	300	0	12,400	24
25	Upkeep	8,600	800	7,200	0	0	0	600	0	8,600	25

Backward-Looking Table C: Occupant Characteristics, Fort Worth

	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	789,400	581,400	51,700	0	1,100	300	152,500	2,400	0	1
	Age of householder										
2	Under 65	660,300	430,100	84,900	0	1,100	300	141,600	2,400	0	2
3	65 to 74	72,800	7,500	56,700	0	0	0	8,600	0	0	3
4	75 or older	56,300	19,400	34,600	0	0	0	2,300	0	0	4
	Children in household										
5	Some	293,800	127,600	92,800	0	700	200	72,200	400	0	5
6	None	495,600	258,900	153,800	0	300	200	80,300	2,000	0	6
	Race and ethnicity										
7	White	630,000	400,800	104,900	0	1,100	300	120,700	2,200	0	7
8	Hispanic	164,500	40,300	100,900	0	700	200	22,400	0	0	8
9	Non-Hispanic	465,500	307,100	57,400	0	300	200	98,300	2,200	0	9
10	Black	116,300	44,700	47,900	0	0	0	23,400	200	0	10
11	Hispanic	3,300	0	3,000	0	0	0	300	0	0	11
12	Non-Hispanic	113,000	43,500	46,200	0	0	0	23,100	200	0	12
13	American Indian or Alaska Native alone	3,700	0	3,400	0	0	0	300	0	0	13
14	Asian or Pacific Islander	32,400	9,000	16,200	0	0	0	7,200	0	0	14
16	Other	7,000	6,100	0	0	0	0	900	0	0	16
17	Hispanic or Latino (any race)	172,200	68,500	79,500	0	700	200	23,300	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	616,800	403,400	76,200	0	1,100	300	133,600	2,200	0	18
20	Dividends, interest, or rent	142,600	61,900	50,700	0	0	0	29,900	0	0	20
21	Public assistance or public welfare	5,700	800	5,000	0	0	0	0	0	0	21

Backward-Looking Table D: Income and Housing Cost, Fort Worth

	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	789,400	581,400	51,700	0	1,100	300	152,500	2,400	0	1
	Tenure										
2	Owner-occupied	503,500	355,600	34,800	0	300	200	112,600	0	0	2
3	Homeownership rate	63.8%									3
4	Renter-occupied	285,900	158,500	84,200	0	700	200	39,900	2,400	0	4
	Renter monthly housing costs										
5	No cash rent	8,100	1,000	4,000	0	0	0	1,800	1,300	0	5
6	Less than $350	16,000	10,200	4,300	0	0	0	1,600	0	0	6
7	$350 to $599	35,400	17,700	17,200	0	0	0	500	0	0	7
8	$600 to $799	72,000	24,100	42,700	0	400	200	4,700	0	0	8
9	$800 to $1,249	111,300	24,700	67,200	0	400	0	18,100	1,100	0	9
10	$1,250 or more	43,100	4,400	25,500	0	0	0	13,200	0	0	10
	Renter household income										
11	Less than $15,000	59,000	16,800	36,500	0	0	200	5,500	0	0	11
12	$15,000 to $29,999	79,400	16,800	54,600	0	0	0	8,100	0	0	12
13	$30,000 to $49,999	66,400	13,900	42,000	0	400	0	8,400	1,700	0	13
14	$50,000 to $99,999	63,600	6,900	43,300	0	400	0	12,300	700	0	14
15	$100,000 or more	17,600	500	11,500	0	0	0	5,600	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	18,100	8,000	9,100	0	0	0	1,100	0	0	16
17	$350 to $599	77,400	15,600	58,400	0	0	0	3,400	0	0	17
18	$600 to $799	54,200	8,400	41,100	0	0	0	4,600	0	0	18
19	$800 to $1,249	115,000	28,900	67,700	0	300	200	17,900	0	0	19
20	$1,250 or more	238,800	75,800	77,300	0	0	0	85,700	0	0	20
	Owner household income										
21	Less than $15,000	42,100	8,400	27,800	0	0	0	5,900	0	0	21
22	$15,000 to $29,999	72,500	15,000	50,300	0	0	0	7,100	0	0	22
23	$30,000 to $49,999	93,300	22,200	58,600	0	0	0	12,500	0	0	23
24	$50,000 to $99,999	167,700	57,800	68,000	0	0	200	41,800	0	0	24
25	$100,000 or more	127,900	36,900	45,300	0	300	0	45,400	0	0	25

Forward-Looking Rental Dynamics Table 1: Counts, 2002–2011, Fort Worth

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	36,600	11,100	1,500	8,300	5,600	4,800	300	300	0	2,700	400	1,700
Extremely low rent	14,900	1,600	900	4,200	2,700	1,400	0	0	500	2,100	700	800
Very low rent	108,900	4,000	2,500	45,900	27,600	14,400	1,000	0	800	8,800	1,900	1,900
Low rent	36,500	1,400	200	2,800	8,100	18,000	1,000	0	0	3,400	1,500	100
Moderate rent	18,100	0	0	600	1,300	10,900	1,800	0	200	2,500	500	300
High rent	2,800	0	0	0	0	500	800	400	0	800	300	0
Very high rent	2,500	300	0	0	0	300	1,300	200	200	200	0	0
Extremely high rent	2,500	500	0	200	0	400	300	500	500	200	0	0
Total	222,800	18,900	5,100	62,000	45,300	50,700	6,500	1,400	2,200	20,700	5,300	4,800

Forward-Looking Rental Dynamics Table 2: Row Percentages, 2002–2011, Fort Worth

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	36,600	30.4%	4.1%	22.6%	15.4%	13.1%	0.7%	0.7%	0.0%	7.3%	1.1%	4.6%
Extremely low rent	14,900	10.9%	6.4%	28.3%	17.8%	9.1%	0.0%	0.0%	3.2%	14.4%	4.7%	5.3%
Very low rent	108,900	3.6%	2.3%	42.2%	25.4%	13.3%	0.9%	0.0%	0.8%	8.1%	1.7%	1.8%
Low rent	36,500	3.8%	0.5%	7.6%	22.3%	49.3%	2.7%	0.0%	0.0%	9.4%	4.0%	0.3%
Moderate rent	18,100	0.0%	0.0%	3.5%	7.2%	60.2%	10.1%	0.0%	0.9%	13.7%	2.9%	1.4%
High rent	2,800	0.0%	0.0%	0.0%	0.0%	18.3%	28.6%	12.8%	0.0%	29.1%	11.1%	0.0%
Very high rent	2,500	10.3%	0.0%	0.0%	0.0%	10.8%	51.8%	8.9%	10.2%	8.1%	0.0%	0.0%
Extremely high rent	2,500	19.2%	0.0%	7.0%	0.0%	15.8%	10.9%	18.5%	21.3%	7.3%	0.0%	0.0%
Total	222,800	8.5%	2.3%	27.8%	20.4%	22.8%	2.9%	0.6%	1.0%	9.3%	2.4%	2.1%

Backward-Looking Rental Dynamics Table 1: Counts, 2002–2011, Fort Worth

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	33,200	12,300	1,600	4,500	1,600	0	0	300	500	4,900	0	6,200	1,300
Extremely low rent	8,100	1,500	1,000	2,700	200	0	0	0	0	2,500	0	200	0
Very low rent	86,500	8,700	4,600	51,800	3,300	700	0	0	200	8,500	3,500	3,100	2,100
Low rent	67,000	5,800	2,900	30,800	9,700	1,500	0	0	0	10,700	700	4,500	400
Moderate rent	95,700	5,100	1,400	15,600	20,000	12,200	600	300	500	19,700	1,000	19,000	500
High rent	21,900	200	0	1,100	1,100	2,000	900	1,500	400	8,300	0	6,500	0
Very high rent	4,500	300	0	0	0	0	400	400	500	400	0	2,600	0
Extremely high rent	4,600	0	500	800	0	200	0	300	400	600	0	1,800	0
Total	321,600	33,900	12,000	107,400	35,900	16,600	1,800	2,700	2,400	55,500	5,100	44,000	4,300

Backward-Looking Rental Dynamics Table 2: Row Percentages, 2002–2011, Fort Worth

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	33,200	37.1%	4.8%	13.5%	4.7%	0.0%	0.0%	0.9%	1.4%	14.7%	0.0%	18.8%	4.0%
Extremely low rent	8,100	18.3%	12.2%	32.9%	2.6%	0.0%	0.0%	0.0%	0.0%	31.2%	0.0%	2.8%	0.0%
Very low rent	86,500	10.1%	5.3%	59.9%	3.8%	0.8%	0.0%	0.0%	0.2%	9.8%	4.0%	3.6%	2.4%
Low rent	67,000	8.7%	4.3%	46.0%	14.5%	2.2%	0.0%	0.0%	0.0%	16.0%	1.0%	6.8%	0.5%
Moderate rent	95,700	5.3%	1.5%	16.3%	20.9%	12.7%	0.6%	0.3%	0.5%	20.5%	1.0%	19.8%	0.5%
High rent	21,900	1.0%	0.0%	5.0%	4.8%	9.3%	3.9%	6.9%	1.7%	37.6%	0.0%	29.8%	0.0%
Very high rent	4,500	6.3%	0.0%	0.0%	0.0%	0.0%	8.4%	8.0%	10.6%	8.7%	0.0%	58.0%	0.0%
Extremely high rent	4,600	0.0%	10.5%	18.3%	0.0%	4.3%	0.0%	5.5%	9.4%	12.6%	0.0%	39.3%	0.0%
Total	321,600	10.5%	3.7%	33.4%	11.2%	5.2%	0.6%	0.8%	0.7%	17.3%	1.6%	13.7%	1.3%