

American Housing Survey

**Components of
Inventory Change
And Rental Market Dynamics:
Fort Worth-Arlington
1994-2002**

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Principal Authors: Frederick J. Eggers & Fouad Moumen

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Components of Inventory Change and Rental Market Dynamics: Fort Worth-Arlington 1994-2002

Overview

Housing analysts use two techniques—Components of Inventory Change (CINCH) and rental market dynamics—to look at a housing market at two points in time and explain how the observed changes came about in physical (bricks and mortar) terms. CINCH focuses first on the overall number and then the characteristics of units at different times. Using CINCH methods, analysts answer such question as: “What happened to the x units that disappeared from the housing stock between the beginning and the end of the period?” or “Where did the increase in owner-occupied units come from?” Rental market dynamics, which is really a type of CINCH analysis, focuses on the rental market with particular emphasis on the affordability of rental housing. Using rental market dynamics techniques, analysts answer such questions as: “Have the number of rental units affordable to households with very low incomes increased or decreased over the period?” or “What happened to the units that were affordable to low-income households at the beginning of the period?”

Previously HUD commissioned CINCH and rental market dynamics analyses using the national American Housing Survey (AHS).¹ This report focuses on the Fort Worth-Arlington metropolitan housing market over the period between 1994 and 2002. It is one of 13 reports based on local American Housing Surveys conducted in 2002; these 13 metropolitan areas were previously surveyed in either 1994 or 1995.

CINCH and rental market analysis have both forward-looking and backward-looking components. In the forward-looking components, analysts start with the housing stock available at the beginning of the period and then, looking at the end of the period, attempt to explain what happened to those units. Possible answers include some units still exist and serve the same market, some units still exist but serve a different market, some units have been demolished or destroyed in natural disasters, or some units are being used for nonresidential purposes. In the backward-looking component, analysts start with the housing stock available at the end of the period and, looking at the beginning of the period, attempt to explain where those units came from. Possible answers include some units existed at the beginning of the period and served the same market, some units existed at the beginning of the period but served a different market, some units were newly constructed over the period, or some units were being used for nonresidential purposes at the beginning of the period. Neither CINCH nor rental market dynamics try to track the experience of a unit over the entire period; both are interested only in the beginning and the end of the period. For example, a housing unit in 1994 may have become a medical office in 1997, but returned to being a housing unit in 2000. CINCH

¹ See <http://www.huduser.org/datasets/cinch.html> and <http://www.huduser.org/datasets/ahs/ahsReports.html#2>.

would record this unit as having undergone no change over the period from 1994 to 2002. In classical analytical jargon, CINCH and rental market dynamics are *comparative static* analyses.

Ideally one would want to combine the forward-looking and backward-looking analyses to produce a complete accounting that can explain the beginning and the end consistently in terms of units that existed in both periods, losses from the stock over the period, and additions to the stock over the period. The analysis in this report uses the AHS, which is a sample of units at both points in time; and, unfortunately, previous efforts using the AHS have demonstrated that creating sample weights that take both periods into account generates some inconsistent or inaccurate results. For this reason, the most recent analyses have separated the forward-looking and backward-looking components. This report will do the same. (Weighting is explained briefly in Appendix B and more fully in a separate paper cited in the Appendix.)

The remainder of this report consists of four sections:

- An explanation of how to read the CINCH tables.
- Two sets of four tables each: a set of forward-looking tables tracing the movement of units from 1994 to 2002 and identifying how units were lost to the housing stock; and a set of backward-looking tables tracing where 2002 units came from and distinguishing between units that were part of the stock in 1994 and units that were additions to the stock since 1994.
- A brief discussion of the rental market dynamics.
- Two rental market dynamics tables, one forward-looking and one backward-looking.

At various places, the discussion points out some of the limitations of these analyses or of using the AHS metropolitan samples for these analyses.

Two appendixes explain how the results were tested and how the weights were created.

How to Read CINCH Tables

Rows and columns serve different purposes in CINCH tables. The rows identify classes of units to be analyzed. The columns trace those units either forward or backward.

The forward-looking tables are concerned with what happened to the 1994 housing stock by 2002. There are three basic dispositions of 1994 units: units that continue to exist in 2002 with the same characteristics (or serving the same market), units that continue to exist in 2002 but with different characteristics (or serving a different market), and units that were lost to the stock.

The backward-looking tables are concerned with where the 2002 housing stock came from in reference to 1994. There are three basic sources of 2002 units: units that existed in 1994 with the same characteristics (or serving the same market), units that existed in 1994 but with different characteristics (or serving a different market), and units that are additions to the housing stock.

Since the essence of the CINCH analysis is in the columns, we will explain the columns in detail.

Columns Common to Both Forward-Looking and Backward-Looking Tables:

- The first and last columns contain the row numbers. The row numbers are identical for the same tables in the forward-looking and backward-looking sets.

Columns A through E set up the analysis and track units that exist in both periods.

- Column A specifies the characteristic that defines the subset of the stock that is being tracked forward or backward in a particular row. For example, row 2 of Table 1 focuses on occupied units; row 15 focuses on units built in 1985 through 1989.
- Column B gives the estimate published in the AHS report for the number of units that satisfy the conditions specified in column A. For example, the 1994 AHS report for Fort Worth-Arlington counted 501,400 occupied units (column B, row 2, Forward-Looking Table 1); the 2002 AHS report counted 585,900 occupied units (column B, row 2, Backward-Looking Table 1).
- Column C gives the CINCH estimate of the number of units that satisfy two conditions: (a) being part of the housing stock in the relevant year (1994 for the forward-looking tables and 2002 for the backward-looking tables); and (b) satisfying the condition in column A. CINCH uses different weights than those used in preparing the published reports. Therefore, CINCH estimates can differ from AHS estimates for particular subsets of the housing stock. As explained in Appendix B, the weights were created to match AHS published totals for rows 2 through 4 of Table 1. This perfect match will not be true of other rows.² In the case of the Fort Worth-Arlington metropolitan area, the CINCH weights produce population estimates that are very close to the published estimates except for units built after 1989 and owner monthly housing costs less than \$500 (both in the backward-looking tables).

² Columns B and C will also match, except for rounding, in row 1 of Table 1 because row 1 is defined as the sum of rows 2 through 4.

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- Column D is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, and (b) continue to belong to the subset defined by column A. For example, column D of row 2 of Forward-Looking Table 1 estimates that 449,290 of the occupied units were occupied in 2002.
- Column E is the CINCH estimate of the number of units from column C that (a) are also part of the housing stock in the *other* year, but (b) no longer belong to the subset defined by column A. Column E of row 2 indicates that 39,370 units that were occupied in 1994 are still part of the housing stock in 2002 but are no longer occupied. In some cases, the analysis will not allow a unit to change characteristics between the base year and the other year. Examples include type of structure, year built, and number of stories—characteristics that are considered impossible or unlikely to change.

Columns Unique to Forward-Looking Tables

In forward-looking tables, columns F through K track what happened to units that were lost from 1994 to 2002.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2002 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 710 units were lost to mergers and conversions.
- Column G is the CINCH estimate of the number of mobile homes from column C that were moved out during the period. Among occupied units, 2,380 mobile homes were moved out. The AHS does not follow a manufactured housing unit that is moved and, therefore, cannot distinguish between units that are relocated and units that are demolished. It treats all moves as losses.
- Column H is the CINCH estimate of the number of units from column C that became nonresidential at the end of the period. For example, a real estate firm, a tax preparation office, a palm reader, or some other business might buy or rent a house to use for business rather than residential purposes.³ Among occupied units, 870 became nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were demolished or were destroyed by fires or natural disasters by 2002. In this case, 6,410 units were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2002 were condemned or that were no longer usable for housing because of

³ 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. So nonresidential means strictly no residential use.

extensive damage. Among occupied units, 710 units are no longer usable for housing.

- Column K is the CINCH estimate of the number of units from column C that were lost by 2002 for other reasons. These include units that the Census Bureau eliminated for sampling purposes and other miscellaneous losses. Among occupied units, there were 1,680 units lost for these miscellaneous reasons.

The columns form a closed system. Column C counts the number of units tracked; columns D through K account for all the possible outcomes. Therefore, column C minus the sum of columns D through K always equals zero, except for rounding.⁴

Columns Unique to Backward-Looking Tables

In backward-looking tables, columns F through I track where units came from that are part of the housing stock in 2002, but were not part of the housing stock in 1994.⁵

- Column F is the CINCH estimate of the number of mobile homes from column C that were moved in during the period. Among occupied units, 1,380 mobile homes were moved in (column F, row 2 of Backward-Looking Table 1).⁶ Move-ins are treated as additions to balance the treatment of move-outs as losses.
- Column G is the CINCH estimate of the number of units from column C that had been nonresidential in 1994. Among occupied units, 1,330 had been nonresidential.
- Column H is the CINCH estimate of the number of units from column C that were newly constructed between 1994 and 2002. Among occupied units, 73,480 units were newly constructed.
- Column I is the CINCH estimate of the number of units from column C that were added by 2002 for other reasons. These include units that were considered temporary losses because occupancy was prohibited in 1994 or the interior of the unit was exposed to the elements, and also units that the Census Bureau considered temporarily lost to the housing stock for reasons “not classified.” Among occupied units, 2,030 had been temporarily lost to the stock in 1994.

⁴ The weighted numbers are rounded to the nearest 10. The AHS publication rounds to the nearest 100. We found that rounding to the nearest 10 worked better for the metropolitan sites. The weights were typically in the range of 100 to 300 and in many rows the numbers in columns F through K were small. With a weight of 149, rounding to the nearest hundred would mean that one sample observation would be rounded to 100, two sample observations to 300, and three sample observations to 400. Rounding to the nearest ten results in weighted totals of 150, 300, and 450 for these cases.

⁵ This list does not contain a column for units added through mergers and conversions. The Census Bureau did not code the variable that would normally identify mergers and conversions in 2002 (REUAD=7 or 8).

⁶ The Census Bureau did not code the variable that would normally identify mobile home move-ins in 2002 (REUAD=4). We estimated these from another variable (NOINT=13).

Table 1

Table 1 focuses on the general housing characteristics of the stock. Row 1 provides the highest level CINCH overview of the stock. For this row, column A specifies no conditions other than being part of the stock in the relevant year.

Rows 2-4 divide the housing stock by use. By Census Bureau definition, the number of occupied non-seasonal units equals the number of households. Because households are the basis for all the analyses in Tables 2 through 4, it is important to get a good starting point for these estimates. For this reason, the weights are designed to match published AHS totals for occupied units, vacant units, and seasonal units.

Rows 5-12 divide the housing stock by type of structure to identify what type of units account for losses.⁷ The Census Bureau sometimes suppresses data to protect the confidentiality of respondents. For some metropolitan areas, suppression results in zero estimates for certain multiunit structures in the public data file, whereas the published tables contain estimates for these multiunit classes. Because of suppression, units in structures with 50 or more units are listed in row 10 instead of row 11 in Forward-Looking Table 1 for the Fort Worth-Arlington metropolitan area.

Rows 13-23 divide the housing stock by year built.⁸ The published reports use the categories 1990-1994, 1995-1999, and 2000-2004; we use 1990-1994 and 1995-2002 to isolate units newly constructed since the previous AHS survey.⁹ Column I shows that losses due to demolition or disasters were heavily concentrated in units built in the 1930s and units built before 1920, each group losing approximately 10 percent between 1994 and 2002.

Rows 24-30 and 31-35 divide the housing stock by two different measures of interior space, the number of rooms and the number of bedrooms.¹⁰

Rows 36-41 focus on multiunit structures only and divide them by number of stories. Column E is forced to be zero and, depending on the metropolitan area, the Census Bureau may suppress information, forcing some rows to be zero (rows 40 and 41 in the case of Fort Worth-Arlington). In general, the published reports contain matching data for row 36 only.

Rows 42-43 divide the housing stock between central cities units and suburban residences to determine how the observed changes vary by location. New construction accounted for

⁷ In general, the CINCH estimates exceed published AHS estimates for single-family detached units and fall short of the published AHS estimates for manufactured homes by roughly equal amounts.

⁸ Row 13 is not included in the forward-looking tables, because the 1994 housing stock cannot contain units built after 1994.

⁹ We use REUAD=3 and not year built to identify new construction. For this reason, there are units built after 1994 that are not considered new construction. In addition, year built is obtained from the respondent interview and may be inaccurate.

¹⁰ Because of small sample sizes in the losses and additions columns, we combined room categories that the published reports list separately.

approximately 10 percent of central city housing stock and approximately 15 percent of the suburban housing stock. Rows 44-45 divide the housing stock by whether or not the occupants have moved in within the last two calendar years to determine if certain units consistently have high turnover and to see if high turnover units are more susceptible to loss.

Table 2

This table pertains to issues related to the physical quality of units. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-3 look at whether the units have complete kitchens; that is, have an installed sink with piped water, a mechanical refrigerator, and built-in burners for the exclusive use of the occupants. Rows 4-5 look at whether the units have complete plumbing facilities; that is, hot and cold piped water, a flush toilet, and a bathtub or shower inside the structure for the exclusive use of the occupants. Rows 6-8 look at each of these requirements separately. In the 1994 AHS, the published reports separate out the “exclusive use” category; in the data used for this report, these units show up in row 8. Rows 2-3, 4-5, and 6-8 attempted to separate out good units from the least desirable units, based on kitchen and bath equipment, to compare how they changed over the period.

Rows 9-13 pertain to how units obtain water and dispose of sewage.

Rows 14-19 look at units with serious problems. Rows 15-19 identify specific types of serious deficiencies. Row 14 counts the units having one or more of these deficiencies. Rows 20-25 look at units with moderate problems. Rows 21-25 identify specific types of deficiencies. Row 20 counts the units having one or more of these deficiencies.¹¹ These rows are in the analysis to answer two questions: whether poor-quality units in one year are also poor-quality units in the other year, and whether poorer quality units are more likely to be lost. Both the forward-looking and backward-looking analyses indicate that there is little continuity over the 8 years with respect to having serious physical problems. Fewer than 5 percent of the units with serious problems in 1994 had serious problems in 2002, and fewer than 2 percent of the units with serious problems in 2002 had had serious problems in 1994. There was substantial continuity of moderate problems: 30 percent of the units with moderate problems in 1994 had moderate problems in 2002, and 32 percent of the units with moderate problems in 2002 had had moderate problems in 1994. Fewer than 2 percent of the units had serious problems in either year, and fewer than 10 percent had moderate problems in either year.

¹¹ For definitions of serious and moderate problems see pages 998 and 999 of the AHS Codebook, version 1.77, at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf.

Table 3

This table pertains to the characteristics of occupants. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-3 look at the age of the householder. Rows 4-5 look at whether the household includes children. Rows 6-11 look at the race or ethnicity of the householder. Rows 12-14 look at three possible sources of household income. In all cases, the analysis seeks to determine how stable the occupancy characteristics are over time, and what part of the market was served by units that lost between 1994 and 2002. In Fort Worth-Arlington, units occupied by Blacks were twice as likely to have been demolished or destroyed by 2002 as units occupied by Whites (2.5 percent versus 1.1 percent).

Table 4

Table 4 pertains to tenure, income, and housing costs. Row 1 repeats the analysis from row 2 in Table 1. All the subsequent rows are based on row 1.

Rows 2-4 focus on tenure to determine the extent to which units change tenure characteristics and whether rental or owner-occupied units are more likely to be lost. Rental units in Fort Worth-Arlington were 10 times as likely to be lost due to demolition or disasters as owner-occupied units (3.0 percent versus 0.3 percent).

Rows 5-11 contain a partial rental dynamics analysis.¹² Row 5 identifies non-market units, a class that includes subsidized units and units provided for no cash rents; for example, units given to maintenance or management personnel or to relatives. The remaining rows divide market rental units into affordability classes. In defining affordability, the analysis sets boundaries for each class based on the highest rent a household in an income group could afford without spending more than 30 percent of its monthly income on rent. Ideally there would be six categories in each metropolitan area:

- Extremely-low-rent units (rents affordable to households with incomes equal to 35 percent of area median family income).
- Very-low-rent units (rents not affordable at 35 percent, but affordable at 50 percent of area median family income).
- Low-rent units (rents not affordable at 50 percent, but affordable at 65 percent of area median family income).
- Moderate-rent units (rents not affordable at 65 percent, but affordable at 80 percent of area median family income).

¹² The rental dynamics analysis is partial because it traces movement out of, but not into, particular rental classes. Tables A and B in the final section of this report contain a complete rental dynamics analysis.

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- High-rent units (rents not affordable at 80 percent, but affordable at 100 percent of area median family income).
- Very-high-rent units (rents not affordable at 100 percent of area median family income).

For most metropolitan areas studied, the number of categories is fewer than six, because the Census Bureau had to place an upper limit on the rents reported in the public-use data to protect the confidentiality of respondents. In Fort Worth-Arlington, there are only four classes, with moderate-rent, high-rent, and very-high-rent units grouped into one class.

Rows 12-16 track rental units by household income; rows 22-26 track owner-occupied units by household income.¹³

Rows 17-21 identify owner-occupied units by total monthly housing costs.¹⁴

Looking both forward and backward, there was less movement among the cost categories and among the income categories for both renters and owners than in most other metropolitan areas. For example, in Forward-Looking Table 4, among owner-occupied units with monthly housing costs less than \$499 in 1994 and owner-occupied units with monthly housing costs between \$1,000 and \$1,499, approximately 50 percent of the units were in the same cost category in 2002. Among owner-occupied units with monthly housing costs of \$1,500 or more, 60 percent were in the same category in 2002. There are four reasons one would expect considerable movement across categories: the categories are defined in nominal dollars, not real dollars; there was substantial growth in nominal income over the 8-year period; while inflation was modest, there was some rental inflation over the period; and movement could be the result of units changing tenure or occupancy status. The rental dynamics analysis will look at the movement of units across tenure and occupancy statuses.

¹³ Because of small sample sizes in the losses and additions columns, we combined income categories that the published reports list separately.

¹⁴ Because of small sample sizes in the losses and additions columns, we combined cost categories that the published reports list separately.

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Forward-Looking Table 1: Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published numbers	C Present in 1994	D 1994 units present in 2002	E Change in character- istics	F '94 units affected by conversion /merger	G '94 mobile homes moved out	H '94 units changed to nonresidential use	I '94 units lost through demolition or disaster	J '94 units badly damaged or condemned	K '94 units lost in other ways	
1	Total Housing Stock	555,400	555,300	534,410	0	870	3,130	1,850	10,650	2,240	2,150	1
	Occupancy Status											
2	Occupied	501,400	501,400	449,290	39,370	710	2,380	870	6,410	710	1,680	2
3	Vacant	52,700	52,700	7,110	37,640	160	550	980	4,240	1,530	470	3
4	Seasonal	1,200	1,200	140	860	0	200	0	0	0	0	4
	Units in Structure											
5	1, detached	374,500	374,620	366,330	0	510	370	1,350	4,540	670	840	5
6	1, attached	12,900	13,130	12,620	0	190	0	0	330	0	0	6
7	2 to 4	34,800	34,720	31,500	0	170	0	500	2,550	0	0	7
8	5 to 9	44,000	45,410	42,840	0	0	0	0	1,710	860	0	8
9	10 to 19	50,300	49,740	48,570	0	0	0	0	1,180	0	0	9
10	20 to 49	20,700	21,860	21,190	0	0	0	0	340	0	330	10
11	50 or more	2,100	0	0	0	0	0	0	0	0	0	11
12	Mobile Home/trailer	16,100	15,810	11,370	0	0	2,760	0	0	710	980	12
	Year Built											
14	1990-1994	38,400	36,010	35,650	0	0	370	0	0	0	0	14
15	1985-1989	69,200	65,870	65,170	0	0	190	0	0	350	160	15
16	1980-1984	107,500	103,720	102,470	0	0	540	0	0	340	370	16
17	1970-1979	107,600	109,250	105,180	0	0	1,860	680	690	360	490	17
18	1960-1969	88,100	89,750	83,860	0	0	170	330	3,540	1,020	820	18
19	1950-1959	69,300	69,990	68,640	0	0	0	0	1,350	0	0	19
20	1940-1949	40,500	42,680	39,370	0	170	0	850	1,980	0	310	20
21	1930-1939	23,100	25,380	22,320	0	350	0	0	2,540	160	0	21
22	1920-1929	8,000	8,610	8,270	0	170	0	0	160	0	0	22
23	1919 or earlier	3,800	4,040	3,490	0	170	0	0	380	0	0	23

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Forward-Looking Table 1 (continued): Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published numbers	C Present in 1994	D 1994 units present in 2002	E Change in character- istics	F '94 units affected by conversion /merger	G '94 mobile homes moved out	H '94 units changed to nonresidential use	I '94 units lost through demolition or disaster	J '94 units badly damaged or condemned	K '94 units lost in other ways	
	Rooms											
24	1 – 4 rooms	167,100	167,740	121,630	33,760	530	920	1,160	6,760	1,000	1,990	24
25	5 rooms	131,800	133,280	70,970	58,120	170	740	360	1,520	1,240	160	25
26	6 rooms	125,200	125,180	60,550	61,790	170	1,100	330	1,240	0	0	26
27	7 rooms	65,600	66,140	21,950	43,160	0	370	0	660	0	0	27
28	8 rooms	32,400	32,040	11,600	20,440	0	0	0	0	0	0	28
29	9 rooms	19,500	18,340	5,080	13,100	0	0	0	160	0	0	29
30	10 rooms or more	13,700	12,570	2,460	9,800	0	0	0	310	0	0	30
	Bedrooms											
31	None	3,300	2,430	570	1,510	0	0	0	350	0	0	31
32	1	88,100	89,760	72,540	9,880	190	740	990	4,530	180	700	32
33	2	147,600	149,530	119,030	23,730	340	550	670	2,570	1,350	1,290	33
34	3	249,400	248,440	219,020	23,660	340	1,470	190	2,890	700	160	34
35	4 or more	67,000	65,140	55,110	9,340	0	370	0	310	0	0	35
36	Multiunit Structures Stories in Structures	151,900	151,730	144,090	0	170	0	500	5,780	860	330	36
37	1		21,140	19,410	0	0	0	0	1,720	0	0	37
38	2		110,010	104,090	0	170	0	500	4,060	860	330	38
39	3		20,590	20,590	0	0	0	0	0	0	0	39
40	4 to 6		0	0	0	0	0	0	0	0	0	40
41	7 or more		0	0	0	0	0	0	0	0	0	41
	Metro Status											
42	In central cities		261,090	250,960	0	680	170	1,140	6,350	990	800	42
43	In suburbs		294,210	283,450	0	190	2,960	710	4,300	1,250	1,350	43
	Mover Status											
44	Moved in last 2 years		157,170	48,970	102,240	520	910	170	3,530	170	660	44
45	Not a recent mover		344,230	289,920	47,520	190	1,470	700	2,880	540	1,010	45

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Forward-Looking Table 2: Condition of Unit – All Occupied Units

	A Characteristics	B Published numbers	C Present in 1994	D 1994 units present in 2002	E Change in character- istics	F '94 units affected by conversion /merger	G '94 mobile homes moved out	H '94 units changed to nonresidential use	I '94 units lost through demolition or disaster	J '94 units badly damaged or condemned	K '94 units lost in other ways	
1	Occupied Units	501,400	501,400	449,290	39,370	710	2,380	870	6,410	710	1,680	1
	Kitchen											
2	With complete kitchen	498,800	498,800	440,650	45,580	710	2,380	870	6,230	710	1,680	2
3	Lacking complete kitchen facilities	2,600	2,600	0	2,430	0	0	0	170	0	0	3
	Plumbing											
4	With all plumbing facilities	501,100	500,980	445,960	42,270	710	2,380	870	6,410	710	1,680	4
5	Lack some plumbing	300	420	120	300	0	0	0	0	0	0	5
6	No hot piped water	0	0	0	0	0	0	0	0	0	0	6
7	No bathtub/shower	300	300	120	170	0	0	0	0	0	0	7
8	No flush toilet	0	120	0	120	0	0	0	0	0	0	8
	Water											
9	Public/private water	494,300	493,730	443,310	38,600	710	1,640	870	6,210	710	1,680	9
10	Well	4,200	4,520	2,170	1,420	0	740	0	190	0	0	10
11	Other water source	3,000	3,150	0	3,150	0	0	0	0	0	0	11
	Sewer											
12	Public sewer	469,100	469,790	422,360	38,480	710	170	870	5,380	520	1,310	12
13	Septic tank/cesspool	32,200	31,470	20,450	7,230	0	2,210	0	1,030	190	370	13
14	Severe Problems	2,500	2,480	120	2,360	0	0	0	0	0	0	14
15	Plumbing	400	420	120	300	0	0	0	0	0	0	15
16	Heating	300	370	0	370	0	0	0	0	0	0	16
17	Electric	0	0	0	0	0	0	0	0	0	0	17
18	Upkeep	1,800	1,690	0	1,690	0	0	0	0	0	0	18
19	Hallways	0	0	0	0	0	0	0	0	0	0	19
20	Moderate problems	42,800	45,490	13,820	28,980	540	370	540	1,250	0	0	20
21	Plumbing	1,500	1,760	0	1,760	0	0	0	0	0	0	21
22	Heating	29,300	32,420	12,240	17,690	540	370	540	1,050	0	0	22
23	Kitchen	2,600	2,600	0	2,430	0	0	0	170	0	0	23
24	Upkeep	11,300	11,520	380	10,780	0	0	0	360	0	0	24
25	Hallways	0	0	0	0	0	0	0	0	0	0	25

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Forward-Looking Table 3: Household Characteristics – All Occupied Units

	A Characteristics	B Published numbers	C Present in 1994	D 1994 units present in 2002	E Change in character- istics	F '94 units affected by conversion /merger	G '94 mobile homes moved out	H '94 units changed to nonresidential use	I '94 units lost through demolition or disaster	J '94 units badly damaged or condemned	K '94 units lost in other ways	
1	Occupied units	501,400	501,400	449,290	39,370	710	2,380	870	6,410	710	1,680	1
	Age											
2	Under 65	430,500	428,920	347,240	69,810	520	2,380	870	6,410	520	1,190	2
3	65 or older	71,000	72,480	41,420	30,190	190	0	0	0	190	490	3
	Children											
4	Some	201,700	201,500	110,680	85,900	520	1,100	170	2,940	170	0	4
5	None	299,700	299,900	196,310	95,760	190	1,270	700	3,460	540	1,680	5
	Race/Origin											
6	White	423,000	422,300	333,130	78,690	710	2,210	870	4,490	540	1,680	6
7	Hispanic	40,000	41,020	22,510	17,310	520	0	0	680	0	0	7
8	Non-Hispanic	383,000	381,290	287,410	84,590	190	2,210	870	3,810	540	1,680	8
9	Black	56,900	56,130	33,380	21,190	0	170	0	1,380	0	0	9
10	Other	21,500	22,970	10,420	11,840	0	0	0	540	170	0	10
11	Total Hispanics	46,200	48,010	30,070	16,380	520	0	0	1,040	0	0	11
	Income Source											
12	Wages and salaries	427,300	426,860	344,480	71,870	520	2,210	870	5,890	340	680	12
13	Welfare or SSI	19,300	20,160	3,040	15,530	0	540	0	860	190	0	13
14	Social security or pension	106,700	108,010	55,110	50,600	190	540	0	520	190	860	14

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Forward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units

	A Characteristics	B Published numbers	C Present in 1994	D 1994 units present in 2002	E Change in character- istics	F '94 units affected by conversion /merger	G '94 mobile homes moved out	H '94 units changed to nonresidential use	I '94 units lost through demolition or disaster	J '94 units badly damaged or condemned	K '94 units lost in other ways	
1	Occupied units	501,400	501,400	449,290	39,370	710	2,380	870	6,410	710	1,680	1
	Tenure											
2	Owner occupied	321,600	320,270	278,820	36,230	0	2,210	500	980	190	1,340	2
3	Percent own occupied	64.1%	63.9%	62.1%	NA	0.0%	92.7%	58.0%	15.2%	27.0%	80.2%	3
4	Renter occupied	179,800	181,130	119,410	54,200	710	170	360	5,430	520	330	4
	Rental Affordability											
5	Non-market		18,870	7,200	11,320	0	0	0	340	0	0	5
6	Extremely low rent		67,590	34,850	27,270	540	170	360	4,220	170	0	6
7	Very low rent		62,100	29,020	32,050	170	0	0	860	0	0	7
8	Low rent		23,330	7,080	15,580	0	0	0	0	340	330	8
9	Moderate to very high rent		9,220	1,650	7,580	0	0	0	0	0	0	9
	Renter Hsd Income											
12	Less than \$20,000	71,300	72,800	23,810	44,270	710	170	0	3,330	170	330	12
13	\$20,000 to \$34,999	54,100	53,620	12,780	39,090	0	0	360	1,210	170	0	13
14	\$35,000 to \$59,999	37,100	37,010	8,120	28,170	0	0	0	710	0	0	14
15	\$60,000 to \$99,999	14,100	14,450	2,310	11,790	0	0	0	170	170	0	15
16	\$100,000 or more	3,400	3,260	410	2,850	0	0	0	0	0	0	16
	Owner Monthly Housing Costs											
17	Less than \$499	109,300	112,900	60,530	48,700	0	1,300	500	330	190	1,340	17
18	\$500 to \$699	46,300	46,550	11,140	34,340	0	740	0	330	0	0	18
19	\$700 to \$999	74,900	74,650	20,910	53,740	0	0	0	0	0	0	19
20	\$1,000 to \$1,499	45,800	44,050	20,750	22,810	0	170	0	310	0	0	20
21	\$1,500 or more	21,000	17,720	11,010	6,700	0	0	0	0	0	0	21
a	Missing mort data	24,400	24,410	4,760	19,650	0	0	0	0	0	0	a
	Owner Hsd Income											
22	Less than \$20,000	54,000	54,660	18,410	35,570	0	0	0	0	190	490	22
23	\$20,000 to \$34,999	65,900	65,250	12,130	51,330	0	930	0	0	0	860	23
24	\$35,000 to \$59,999	91,300	94,420	23,520	69,290	0	1,280	0	330	0	0	24
25	\$60,000 to \$99,999	74,300	70,690	22,660	46,870	0	0	500	650	0	0	25
26	\$100,000 or more	36,200	35,260	17,490	17,770	0	0	0	0	0	0	26

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Backward-Looking Table 1: Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published numbers	C Present in 2002	D 2002 units present in 1994	E Change in character- istics	F '02 mobile homes moved in	G '02 units derived from nonresidential use	H '02 units added by new construction	I '02 units added from temporary losses	
1	Total	639,400	639,400	552,130	0	1,930	1,450	81,380	2,520	1
	Occupancy Status									
2	Occupied	585,900	585,900	466,300	41,370	1,380	1,330	73,480	2,030	2
3	Vacant	51,700	51,700	6,980	35,680	550	120	7,890	490	3
4	Seasonal	1,800	1,800	140	1,660	0	0	0	0	4
	Units in Structure									
5	1, detached	433,300	446,390	379,900	0	340	120	64,280	1,760	5
6	1, attached	62,800	62,860	54,630	0	0	630	6,960	650	6
7	2 to 4	24,300	24,610	23,240	0	0	130	1,240	0	7
8	5 to 9	29,500	30,130	28,560	0	0	130	1,430	0	8
9	10 to 19	40,400	41,150	36,900	0	0	310	3,940	0	9
10	20 to 49	17,000	15,880	12,640	0	0	0	3,240	0	10
11	50 or more	3,200	3,620	3,220	0	0	0	290	120	11
12	Mobile Home/trailer	28,900	14,750	13,030	0	1,590	130	0	0	12
	Year Built									
13	1995-2002	91,200	77,110	1,140	0	220	0	75,750	0	13
14	1990-1994	38,300	33,670	28,040	0	0	0	5,620	0	14
15	1985-1989	70,600	70,570	69,950	0	120	500	0	0	15
16	1980-1984	108,500	111,960	110,330	0	1,260	190	0	190	16
17	1970-1979	110,500	112,530	111,630	0	110	130	0	660	17
18	1960-1969	80,500	84,470	83,610	0	220	260	0	370	18
19	1950-1959	66,500	71,590	71,340	0	0	0	0	250	19
20	1940-1949	39,400	41,420	40,620	0	0	0	0	800	20
21	1930-1939	22,700	23,980	23,360	0	0	370	0	250	21
22	1920-1929	7,800	8,510	8,510	0	0	0	0	0	22
23	1919 or earlier	3,400	3,600	3,600	0	0	0	0	0	23

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Backward-Looking Table 1 (continued): Structural and Location Characteristics – All Housing Units

	A Characteristics	B Published numbers	C Present in 2002	D 2002 units present in 1994	E Change in character- istics	F '02 mobile homes moved in	G '02 units derived from nonresidential use	H '02 units added by new construction	I '02 units added from temporary losses	
	Rooms									
24	1 – 4 rooms	165,700	163,800	125,170	24,500	810	1,320	11,250	750	24
25	5 rooms	167,600	170,250	73,480	82,500	640	130	12,640	860	25
26	6 rooms	142,700	146,080	62,640	69,430	350	0	13,030	640	26
27	7 rooms	71,600	71,890	22,770	35,190	120	0	13,670	140	27
28	8 rooms	49,300	47,640	12,030	22,570	0	0	12,910	130	28
29	9 rooms	25,500	23,890	5,250	9,840	0	0	8,790	0	29
30	10 rooms or more	17,000	15,850	2,540	4,220	0	0	9,090	0	30
	Bedrooms									
31	None	2,200	2,110	590	1,120	0	130	150	120	31
32	1	89,800	90,410	74,560	6,750	590	500	7,760	250	32
33	2	147,200	146,720	122,910	15,420	220	690	6,840	650	33
34	3	284,300	289,580	226,740	29,320	1,120	130	30,890	1,380	34
35	4 or more	115,900	110,590	57,100	17,620	0	0	35,740	130	35
36	Multiunit Structures	114,400	115,390	104,570	0	0	570	10,140	120	36
	Stories in Structures									
37	1		15,680	14,170	0	0	130	1,380	0	37
38	2		73,480	71,330	0	0	440	1,700	0	38
39	3		24,110	17,490	0	0	0	6,620	0	39
40	4 to 6		2,130	1,570	0	0	0	440	120	40
41	7 or more		0	0	0	0	0	0	0	41
	Metro Status									
42	In central cities		294,510	259,310	0	560	1,000	31,930	1,700	42
43	In suburbs		344,890	292,810	0	1,360	440	49,450	820	43
	Mover Status									
44	Moved in last 2 years		153,120	50,830	68,080	640	940	31,430	1,200	44
45	Not a recent mover		432,780	300,670	88,100	730	390	42,060	830	45

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Backward-Looking Table 2: Condition of Unit – All Occupied Units

	A Characteristics	B Published numbers	C Present in 2002	D 2002 units present in 1994	E Change in character- istics	F '02 mobile homes moved in	G '02 units derived from nonresidential use	H '02 units added by new construction	I '02 units added from temporary losses	
1	Occupied Units	585,900	585,900	466,300	41,370	1,380	1,330	73,480	2,030	1
	Kitchen									
2	With complete kitchen	576,100	576,300	457,330	41,640	1,380	1,200	72,720	2,030	2
3	Lacking complete kitchen facilities	9,800	9,600	0	8,700	0	130	760	0	3
	Plumbing									
4	With all plumbing facilities	581,600	581,470	462,850	40,830	1,380	1,200	73,180	2,030	4
5	Lack some plumbing	3,800	4,430	130	3,860	0	130	310	0	5
6	No hot piped water	900	1,010	0	860	0	0	150	0	6
7	No bathtub/shower	600	650	130	240	0	130	150	0	7
8	No flush toilet	600	650	0	370	0	130	150	0	8
	Water									
9	Public/private water	582,100	582,800	460,090	44,760	1,380	1,330	73,330	1,900	9
10	Well	3,800	3,100	2,260	560	0	0	150	130	10
11	Other water source	0	0	0	0	0	0	0	0	11
	Sewer									
12	Public sewer	554,800	561,400	438,350	45,940	1,380	1,200	72,770	1,760	12
13	Septic tank/cesspool	30,900	24,250	21,220	1,910	0	130	720	270	13
	Severe Problems									
14	Severe Problems	8,000	8,180	130	7,460	0	130	460	0	14
15	Plumbing	4,300	4,430	130	3,860	0	130	310	0	15
16	Heating	3,400	3,370	0	3,220	0	0	150	0	16
17	Electric	200	150	0	0	0	0	150	0	17
18	Upkeep	500	380	0	380	0	0	0	0	18
19	Hallways	0	0	0	0	0	0	0	0	19
	Moderate problems									
20	Moderate problems	42,100	44,870	14,340	29,650	0	130	610	130	20
21	Plumbing	1,800	2,660	0	2,500	0	0	150	0	21
22	Heating	24,500	25,840	12,700	12,880	0	130	0	130	22
23	Kitchen	8,300	9,600	0	8,700	0	130	760	0	23
24	Upkeep	10,300	11,520	390	11,120	0	0	0	0	24
25	Hallways	400	800	0	800	0	0	0	0	25

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Backward-Looking Table 3: Household Characteristics – All Occupied Units

	A Characteristics	B Published numbers	C Present in 2002	D 2002 units present in 1994	E Change in character- istics	F '02 mobile homes moved in	G '02 units derived from nonresidential use	H '02 units added by new construction	I '02 units added from temporary losses	
1	Occupied units	585,900	585,900	466,300	41,370	1,380	1,330	73,480	2,030	1
	Age									
2	Under 65	499,900	498,550	360,390	63,240	1,380	1,200	70,430	1,900	2
3	65 or older	86,100	87,350	42,980	41,050	0	130	3,050	130	3
	Children									
4	Some	248,700	248,900	114,880	90,050	770	260	41,290	1,640	4
5	None	337,100	337,000	203,740	99,000	600	1,070	32,190	390	5
	Race/Origin									
6	White	450,100	447,590	345,740	41,750	1,100	1,070	56,890	1,040	6
7	Hispanic	48,500	50,870	23,370	25,430	250	310	1,260	250	7
8	Non-Hispanic	401,500	396,720	298,290	40,400	850	760	55,630	790	8
9	Black	70,000	72,440	34,650	28,610	0	260	8,200	720	9
10	Other	65,800	65,870	10,810	46,120	280	0	8,390	270	10
11	Total Hispanics	89,400	92,040	31,210	54,440	250	310	5,300	520	11
	Income Source									
12	Wages and salaries	509,800	507,470	357,520	75,560	1,380	1,330	69,900	1,770	12
13	Welfare or SSI	15,300	15,430	3,150	11,240	0	0	920	130	13
14	Social security or pension	111,100	114,130	57,200	49,840	0	260	6,570	260	14

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Backward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units

	A Characteristics	B Published numbers	C Present in 2002	D 2002 units present in 1994	E Change in character- istics	F '02 mobile homes moved in	G '02 units derived from nonresidential use	H '02 units added by new construction	I '02 units added from temporary losses	
1	Occupied units	585,900	585,900	466,300	41,370	1,380	1,330	73,480	2,030	1
	Tenure									
2	Owner occupied	392,800	392,250	289,380	41,510	1,100	260	59,410	590	2
3	Percent own occupied	67.0%	66.9%	62.1%	NA	79.9%	19.4%	80.8%	29.0%	3
4	Renter occupied	193,100	193,650	123,930	52,850	280	1,070	14,080	1,440	4
	Rental Affordability									
5	Non-market		18,980	7,480	10,280	0	130	840	260	5
6	Extremely low rent		76,290	36,170	38,050	280	440	460	900	6
7	Very low rent		67,040	30,120	30,680	0	500	5,590	140	7
8	Low rent		22,410	7,350	10,550	0	0	4,370	140	8
9	Moderate to very high rent		8,930	1,710	4,400	0	0	2,820	0	9
	Renter Hsd Income									
12	Less than \$20,000	58,200	57,660	24,710	28,920	280	390	2,840	520	12
13	\$20,000 to \$34,999	53,900	55,300	13,270	39,240	0	0	2,290	510	13
14	\$35,000 to \$59,999	50,200	50,320	8,430	37,250	0	690	3,820	130	14
15	\$60,000 to \$99,999	24,000	23,320	2,400	17,310	0	0	3,320	290	15
16	\$100,000 or more	7,000	7,060	420	4,820	0	0	1,810	0	16
	Owner Monthly Housing Costs									
17	Less than \$499	127,200	118,520	62,820	51,060	240	130	4,140	130	17
18	\$500 to \$699	45,700	46,550	11,560	32,970	250	130	1,520	130	18
19	\$700 to \$999	68,400	71,000	21,700	42,210	620	0	6,470	0	19
20	\$1,000 to \$1,499	90,500	92,300	21,540	47,540	0	0	22,890	330	20
21	\$1,500 or more	61,100	63,880	16,370	23,130	0	0	24,390	0	21
	Owner Hsd Income									
22	Less than \$20,000	47,100	46,760	19,110	26,320	370	0	830	130	22
23	\$20,000 to \$34,999	51,000	53,060	12,590	37,080	250	130	2,550	460	23
24	\$35,000 to \$59,999	91,600	92,480	24,410	58,900	480	0	8,690	0	24
25	\$60,000 to \$99,999	110,900	110,060	23,520	63,140	0	130	23,270	0	25
26	\$100,000 or more	92,200	89,880	18,150	47,660	0	0	24,060	0	26

Rental Market Dynamics¹⁵

Table A expands the analysis in rows 5-11 in Forward-Looking Table 4 into a full rental dynamics analysis by examining in more detail what happened to the units in each row. In particular, the “present in 2002” and “change in characteristics” columns (column D and E in the CINCH tables) are disaggregated into the following options: each of the other rent affordability columns (new columns *D* through *J*), owner-occupancy (new column *K*), and vacant or seasonal status (new column *L*). The remaining columns (columns F through K in the CINCH tables) are collapsed into a “Lost to stock” column (new column *M*). Table B does the same for the analysis of rows 5-11 in Backward-Looking Table 4, with column *M* being additions through new construction and column *N* being additions from other sources.¹⁶ Because the Census Bureau put a cap on the rents it reported for Fort Worth-Arlington in 1994, we cannot distinguish between units in the moderate-rent, high-rent, and very-high-rent categories, and therefore have collapsed these three categories into one category, moderate-to-very-high-rent units (column *J*).

Table A shows that there were 181,130 rental units in the Fort Worth-Arlington metropolitan area in 1994. In 2002, 61,720 of these units were no longer rental; 28,130 were owner-occupied, 26,070 were either vacant or being used seasonally, and 7,520 had been lost to the stock. Taken as a proportion of the units in 1994, movement into owner-occupancy was concentrated among the moderate-to-very-high-rent category, and losses to the stock were concentrated among extremely-low-rent units.

Table B shows there were 193,650 rental units in the Fort Worth-Arlington metropolitan area in 2002, of which 69,730 were not rental units in 1994. The new units came from units that had been owner-occupied (23,790), units that had been vacant or in seasonal use (29,060), newly constructed units (14,080), and other additions (2,800). Most of the formerly owner-occupied units went to the extremely-low-rent and the very-low-rent categories; most of the newly constructed rental units went to very-low-rent and low-rent categories.

Looking at both tables, we see that the overall number of rental units was approximately 10,000 larger in 1994 than in 2002. The number of extremely-low-rent and very-low-rent units combined grew from approximately 130,000 in 1994 to approximately 145,000 in 2002.

¹⁵ This rental dynamics analysis differs from previous analyses in two ways: we do not adjust rents for bedroom sizes and we do not adjust area median family income for inflation.

¹⁶ These tables use all the AHS observations for which we have relevant rent data, including observations where the Census Bureau provided an estimate of contract rent when the respondent did not provide an answer to the rent question. These observations are said to have “allocated” rents. The Watson-Eggers paper cited in footnote 1 studied the effect of allocations on rental dynamics analysis. They found that unallocated data show less dispersion. In their study of the six metropolitan areas surveyed as part of the national AHS, they found that the proportion of rental units that remain in the same rent category increased for all categories except non-market, where the proportion decreased slightly. There also appeared to be less movement of more than one rent category.

Components of Inventory Change and Rental Market Dynamics:
Fort Worth-Arlington 1994–2002

Table A: Forward-Looking Rental Dynamics Analysis

Forward looking	<i>C</i> Number in 1994	<i>D</i> Non- market in 2002	<i>E</i> Extremely low rent in 2002	<i>F</i> Very low rent in 2002	<i>G</i> Low rent in 2002	<i>J</i> Moderate to very high rent in 2002	<i>K</i> Owner- occupied in 2002	<i>L</i> Vacant or seasonal in 2002	<i>M</i> Lost to stock
Non-market	18,870	7,200	3,540	1,900	410	0	4,090	1,390	340
Extremely low rent	67,590	2,240	34,850	6,840	550	480	5,990	11,170	5,470
Very low rent	62,100	2,410	9,030	29,020	2,780	230	7,450	10,140	1,030
Low rent	23,330	170	120	6,010	7,080	170	6,210	2,880	680
Moderate to very high rent	9,220	300	120	220	2,070	1,650	4,390	480	0
Column sum	181,130	12,320	47,660	44,000	12,900	2,530	28,130	26,070	7,520

Table B: Backward-Looking Rental Dynamics Analysis

Backward looking	<i>C</i> Number in 2002	<i>D</i> Non- market in 1994	<i>E</i> Extremely low rent in 1994	<i>F</i> Very low rent in 1994	<i>G</i> Low rent in 1994	<i>J</i> Moderate to very high rent in 1994	<i>K</i> Owner- occupied in 1994	<i>L</i> Vacant or seasonal in 1994	<i>M</i> New construc- tion	<i>N</i> Other additions
Non-market	18,980	7,480	2,320	2,500	180	310	2,000	2,970	840	390
Extremely low rent	76,290	3,670	36,170	9,370	130	130	10,330	14,420	460	1,620
Very low rent	67,040	1,970	7,100	30,120	6,240	230	5,570	9,570	5,590	640
Low rent	22,410	420	580	2,890	7,350	2,150	3,240	1,270	4,370	140
Moderate to very high rent	8,930	0	500	240	180	1,710	2,650	820	2,820	0
Column sum	193,650	13,540	46,660	45,120	14,080	4,530	23,790	29,060	14,080	2,800

Appendix A – Internal and External Checks

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

- For each row, we tested whether the sum of possible outcomes (columns D through K in the forward-looking analysis and columns D through I in the backward-looking analysis) equaled the number of units present in the base year. In every case, equality was achieved except for differences created by rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13-23) in Table 1 are a disaggregation of the total stock in row 1. Similarly, rows 6 (Whites), 9 (Blacks), and 10 (Other race) in Table 3 are a disaggregation of row 1 (occupied households). In these cases, there should be equality between the parent row and the sum of the break-out rows for all columns except D and E. The difference between column D in the parent row and the sum of column D for the break-out rows should equal the negative of the difference between column E in the parent row and the sum of column E for the break-out rows. In every case, equality was achieved except for differences created by rounding.

Column B provides an external check of how well the CINCH weighting performed. In general, the CINCH estimates are within 5 percent of the AHS published totals and many of the CINCH estimates are very close to the AHS estimates. We have footnoted two places where our coding does not seem to produce the same results as the published estimates. We observed that the correspondence between the CINCH and published estimates were closer in the slower growing metropolitan areas. We also noticed that the CINCH weighting tends to underestimate the number of units built since 1989 and the number of Hispanic households.

Appendix B – Weighting

CINCH separates the AHS samples in 1994 and 2002 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 1994 housing stock but are not part of the 2002 housing stock (LOSSES), and units that are not part of the 1994 housing stock but are part of the 2002 housing stock (ADDITIONS). ADDITIONS are split into NEW CONSTRUCTION and RECOVERIES (structures that existed in 1994 but were not in the housing stock).

Because CINCH looks at various subsets of the housing stock, we need to know the characteristics of units and their occupants. Therefore, we can use only those SAMES observations that were interviewed in both years. For the same reason, we can use only those LOSSES that were interviewed in 1994 and those ADDITIONS that were interviewed in 2002.

For the forward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 1994 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted count in 1994 of LOSSES to create weights for interviewed LOSSES. We then adjusted the weights of SAMES and LOSSES to equal the AHS published totals for occupied units, vacant units, and seasonal units in 1994.

For the backward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 2002 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted counts in 2002 for NEW CONSTRUCTION and for RECOVERIES to create weights for interviewed NEW CONSTRUCTION and interviewed RECOVERIES. We then adjusted the weights for SAMES, NEW CONSTRUCTION, and RECOVERIES to equal AHS published totals for occupied units, vacant units, and seasonal units in 2002.

The logic behind the weighting and the procedures used to create the weights is explained in *Weighting for CINCH and Rental Dynamics Analysis*.