American Housing Survey

Components of Inventory Change And Rental Market Dynamics: Anaheim-Santa Ana 1994-2002

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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 Anaheim-Santa Ana 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

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

would record this unit as not having undergone a 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 forwarding-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 Anaheim counted 851,500 occupied units (column B, row 2, Forward-Looking Table 1); the 2002 AHS report counted 937,500 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 Anaheim-Santa Ana metropolitan area, the CINCH weights produce population estimates that are very close to the published estimates, except for units built after 1994 and owner monthly housing costs less than $500 (both in the backward-looking tables). The CINCH weights also tend to overestimate slightly the number of Hispanic households.

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[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.

- 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 800,440 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 43,870 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, 560 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, 310 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, 860 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, 4,850 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

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[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, 410 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 200 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, 810 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, 2,220 had been non-residential.

- 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, 62,170 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, 360 had been temporarily lost to the stock in 1994.

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[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.

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 most likely to occur among units built between 1930 and 1959. Among these units, 2.5 percent were demolished or destroyed 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. For the Anaheim-Santa Ana metropolitan area, the Census Bureau reported all units in structures with 3 or more stories in row 39, and reported no units in rows 40 and 41. 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. In the Anaheim-Santa Ana metropolitan area, 98 percent of the new construction took place in the suburbs. Rows 44-

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[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.

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 was no continuity over the 8 years with respect to having serious physical problems. None of the units with serious problems in 1994 had serious problems in 2002, and none of the units with serious problems in 2002 had had serious problems in 1994. There was little continuity with respect to having moderate problems, in that only 5 percent of the units with moderate problems in 1994 still had moderate problems in 2002, and only 5 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 3 percent had moderate problems in either year.

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.

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[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.

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.

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 Anaheim-Santa Ana were twice as likely to be lost due to demolition or disasters as owner-occupied units.

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).

- 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).

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[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.

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 Anaheim-Santa Ana, there are only five classes with 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]

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[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.

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**	918,000	918,000	909,930	0	750	310	860	5,350	410	400	1
	Occupancy Status											
2	Occupied	851,500	851,500	800,440	43,870	560	310	860	4,850	410	200	2
3	Vacant	65,500	65,500	8,330	56,290	190	0	0	490	0	190	3
4	Seasonal	1,000	1,000	420	580	0	0	0	0	0	0	4
	Units in Structure											
5	1, detached	451,500	453,170	449,870	0	0	0	200	3,100	0	0	5
6	1, attached	63,500	62,270	62,070	0	0	0	0	200	0	0	6
7	2 to 4	118,100	119,650	117,710	0	310	0	0	820	410	400	7
8	5 to 9	100,400	99,740	99,090	0	0	0	240	410	0	0	8
9	10 to 19	83,500	84,080	83,270	0	190	0	410	200	0	0	9
10	20 to 49	47,000	64,520	64,270	0	240	0	0	0	0	0	10
11	50 or more	20,200	0	0	0	0	0	0	0	0	0	11
12	Mobile Home/trailer	33,700	34,580	33,650	0	0	310	0	610	0	0	12
	Year Built											
14	1990-1994	53,800	53,540	53,540	0	0	0	0	0	0	0	14
15	1985-1989	98,100	97,390	96,590	0	240	0	240	310	0	0	15
16	1980-1984	61,500	60,370	60,370	0	0	0	0	0	0	0	16
17	1970-1979	275,200	269,240	268,430	0	190	310	0	300	0	0	17
18	1960-1969	280,800	285,990	283,950	0	310	0	0	1,130	200	400	18
19	1950-1959	101,500	104,820	101,830	0	0	0	410	2,580	0	0	19
20	1940-1949	25,800	25,840	25,220	0	0	0	0	630	0	0	20
21	1930-1939	13,400	13,420	12,820	0	0	0	0	400	200	0	21
22	1920-1929	4,200	4,390	4,390	0	0	0	0	0	0	0	22
23	1919 or earlier	3,900	3,010	2,800	0	0	0	200	0	0	0	23

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	284,300	282,460	233,150	45,410	750	310	200	1,830	410	400	24
25	5 rooms	183,900	186,830	78,530	105,680	0	0	650	1,960	0	0	25
26	6 rooms	174,500	172,620	79,970	91,720	0	0	0	930	0	0	26
27	7 rooms	128,700	129,920	55,980	73,630	0	0	0	310	0	0	27
28	8 rooms	90,500	90,550	36,560	54,000	0	0	0	0	0	0	28
29	9 rooms	38,300	37,280	14,820	22,460	0	0	0	0	0	0	29
30	10 rooms or more	17,900	18,340	7,230	10,790	0	0	0	310	0	0	30
	Bedrooms											
31	None	10,900	10,440	4,810	5,320	310	0	0	0	0	0	31
32	1	116,100	115,320	93,980	19,480	440	0	200	1,010	200	0	32
33	2	300,400	300,690	263,990	33,070	0	310	650	2,060	200	400	33
34	3	294,500	294,580	252,030	40,590	0	0	0	1,960	0	0	34
35	4 or more	196,200	196,970	179,090	17,570	0	0	0	310	0	0	35
36	**Multiunit Structures**	369,200	367,980	364,340	0	750	0	650	1,430	410	400	36
	Stories in Structures											
37	1		58,430	57,090	0	310	0	0	610	200	200	37
38	2		264,100	261,800	0	440	0	650	820	200	190	38
39	3		45,450	45,450	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		166,080	163,500	0	440	0	0	1,740	200	200	42
43	In suburbs		751,920	746,430	0	310	310	860	3,600	200	190	43
	Mover Status											
44	Moved in last 2 years		231,020	62,160	166,130	240	0	650	1,630	200	0	44
45	Not a recent mover		620,480	530,790	85,230	310	310	200	3,220	200	200	45

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**	851,500	851,500	800,440	43,870	560	310	860	4,850	410	200	1
	Kitchen											
2	With complete kitchen	846,800	847,430	787,230	53,000	560	310	860	4,850	410	200	2
3	Lacking complete kitchen facilities	4,700	4,070	210	3,870	0	0	0	0	0	0	3
	Plumbing											
4	With all plumbing facilities	847,800	847,540	791,920	48,430	560	310	860	4,850	410	200	4
5	Lack some plumbing	3,700	3,960	0	3,960	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	0	0	0	0	0	0	0	0	0	0	7
8	No flush toilet	0	3,960	0	3,960	0	0	0	0	0	0	8
	Water											
9	Public/private water	834,800	833,460	783,510	43,270	560	310	860	4,540	200	200	9
10	Well	600	1,160	0	840	0	0	0	310	0	0	10
11	Other water source	16,100	16,880	0	16,680	0	0	0	0	200	0	11
	Sewer											
12	Public sewer	848,400	847,610	795,620	45,310	560	310	860	4,340	410	200	12
13	Septic tank/cesspool	3,100	3,890	1,270	2,100	0	0	0	520	0	0	13
14	**Severe Problems**	5,900	5,850	0	5,650	0	0	0	0	200	0	14
15	Plumbing	3,700	3,960	0	3,960	0	0	0	0	0	0	15
16	Heating	1,000	620	0	620	0	0	0	0	0	0	16
17	Electric	0	0	0	0	0	0	0	0	0	0	17
18	Upkeep	1,400	1,480	0	1,280	0	0	0	0	200	0	18
19	Hallways	0	0	0	0	0	0	0	0	0	0	19
20	**Moderate problems**	23,100	22,520	1,030	21,180	0	0	0	310	0	0	20
21	Plumbing	1,200	1,320	0	1,320	0	0	0	0	0	0	21
22	Heating	4,000	4,130	0	4,130	0	0	0	0	0	0	22
23	Kitchen	4,700	4,070	210	3,870	0	0	0	0	0	0	23
24	Upkeep	13,200	13,620	210	13,100	0	0	0	310	0	0	24
25	Hallways	400	0	0	0	0	0	0	0	0	0	25

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**	851,500	851,500	800,440	43,870	560	310	860	4,850	410	200	1
	Age											
2	Under 65	699,400	696,880	591,320	100,710	0	310	860	3,080	410	200	2
3	65 or older	152,000	154,620	89,900	62,380	560	0	0	1,780	0	0	3
	Children											
4	Some	346,000	348,650	212,820	133,270	0	0	410	1,950	200	0	4
5	None	505,600	502,850	353,690	144,520	560	310	450	2,910	200	200	5
	Race/Origin											
6	White	726,000	728,570	565,850	155,940	560	310	650	4,650	410	200	6
7	Hispanic	128,900	132,740	56,610	74,590	0	0	0	1,340	200	0	7
8	Non-Hispanic	597,100	595,830	453,950	136,640	560	310	650	3,320	200	200	8
9	Black	15,700	14,910	3,880	11,030	0	0	0	0	0	0	9
10	Other	109,800	108,020	72,020	35,580	0	0	200	200	0	0	10
11	Total Hispanics	146,600	150,860	99,730	49,590	0	0	0	1,340	200	0	11
	Income Source											
12	Wages and salaries	701,800	699,290	590,350	103,660	240	310	410	3,710	410	200	12
13	Welfare or SSI	43,300	44,270	4,600	38,740	0	0	200	720	0	0	13
14	Social security or pension	193,600	196,100	113,270	80,700	560	0	0	1,570	0	0	14

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**	851,500	851,500	800,440	43,870	560	310	860	4,850	410	200	1
	Tenure											
2	Owner occupied	513,700	517,160	467,570	46,780	0	310	200	2,090	0	200	2
3	Percent own occupied	60.3%	60.7%	58.4%	NA	0.0%	100.0%	23.9%	43.0%	0.0%	100.0%	3
4	Renter occupied	337,700	334,340	256,170	73,790	560	0	650	2,770	410	0	4
	Rental Affordability											
5	Non-market		24,320	7,520	16,280	310	0	0	200	0	0	5
6	Extremely low rent		24,190	10,610	12,960	0	0	200	200	200	0	6
7	Very low rent		117,220	62,920	53,070	0	0	200	1,020	0	0	7
8	Low rent		97,680	31,090	65,460	0	0	0	930	200	0	8
9	Moderate rent		40,590	10,680	29,260	0	0	240	410	0	0	9
10	High to very high rent		30,340	10,010	20,090	240	0	0	0	0	0	10
	Renter Hsd Income											
12	Less than $20,000	81,300	82,200	21,750	58,470	560	0	410	820	200	0	12
13	$20,000 to $34,999	93,700	93,280	21,020	71,440	0	0	0	820	0	0	13
14	$35,000 to $59,999	92,900	91,880	21,960	68,740	0	0	240	720	200	0	14
15	$60,000 to $99,999	52,900	50,060	8,560	41,090	0	0	0	410	0	0	15
16	$100,000 or more	16,900	16,920	3,520	13,410	0	0	0	0	0	0	16
	Owner Monthly Housing Costs											
17	Less than $499	113,900	119,210	55,390	62,570	0	0	0	1,260	0	0	17
18	$500 to $699	35,200	34,360	7,640	26,400	0	0	0	310	0	0	18
19	$700 to $999	52,300	54,230	7,340	46,060	0	310	0	310	0	200	19
20	$1,000 to $1,499	111,900	113,360	32,460	80,700	0	0	0	200	0	0	20
21	$1,500 or more	142,500	138,250	102,470	35,580	0	0	200	0	0	0	21
a	Missing mort data	57,700	57,760	27,290	30,470	0	0	0	0	0	0	a
	Owner Hsd Income											
22	Less than $20,000	52,700	55,130	13,000	41,190	0	310	0	630	0	0	22
23	$20,000 to $34,999	71,700	72,070	13,030	58,730	0	0	0	310	0	0	23
24	$35,000 to $59,999	122,700	124,980	27,300	97,160	0	0	0	310	0	200	24
25	$60,000 to $99,999	152,300	153,950	44,970	108,350	0	0	0	630	0	0	25
26	$100,000 or more	114,200	111,030	58,070	52,550	0	0	200	200	0	0	26

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**	995,600	995,600	920,900	0	1,050	3,970	69,330	360	1
	Occupancy Status									
2	Occupied	937,500	937,500	813,580	58,360	810	2,220	62,170	360	2
3	Vacant	51,900	51,900	7,690	35,640	240	1,600	6,730	0	3
4	Seasonal	6,200	6,200	460	5,160	0	160	420	0	4
	Units in Structure									
5	1, detached	503,300	506,160	459,120	0	240	2,520	44,270	0	5
6	1, attached	240,900	235,480	219,550	0	0	700	15,050	180	6
7	2 to 4	81,700	83,540	81,510	0	0	180	1,670	180	7
8	5 to 9	43,700	45,580	44,360	0	0	0	1,220	0	8
9	10 to 19	38,800	39,330	38,110	0	0	0	1,220	0	9
10	20 to 49	32,600	30,800	27,030	0	0	360	3,410	0	10
11	50 or more	18,600	18,840	16,140	0	0	210	2,490	0	11
12	Mobile Home/trailer	35,900	35,880	35,070	0	810	0	0	0	12
	Year Built									
13	1995-2002	78,000	65,870	2,110	0	240	180	63,340	0	13
14	1990-1994	55,200	55,560	49,390	0	0	390	5,770	0	14
15	1985-1989	100,300	99,200	98,810	0	0	180	210	0	15
16	1980-1984	62,400	62,170	61,960	0	0	210	0	0	16
17	1970-1979	295,800	294,330	292,200	0	540	1,590	0	0	17
18	1960-1969	256,400	266,980	266,520	0	270	0	0	180	18
19	1950-1959	102,600	105,060	104,340	0	0	730	0	0	19
20	1940-1949	25,600	25,810	25,480	0	0	330	0	0	20
21	1930-1939	12,400	13,140	12,780	0	0	360	0	0	21
22	1920-1929	4,400	4,610	4,430	0	0	0	0	180	22
23	1919 or earlier	2,600	2,870	2,870	0	0	0	0	0	23

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	329,900	329,020	235,250	76,330	770	2,490	13,820	360	24
25	5 rooms	196,700	197,030	79,740	105,880	0	180	11,230	0	25
26	6 rooms	173,500	176,090	81,090	86,430	270	210	8,080	0	26
27	7 rooms	135,900	134,900	56,770	67,870	0	630	9,640	0	27
28	8 rooms	87,700	87,420	37,190	39,160	0	270	10,800	0	28
29	9 rooms	43,700	43,570	15,010	20,180	0	180	8,200	0	29
30	10 rooms or more	28,200	27,560	7,360	12,650	0	0	7,560	0	30
	Bedrooms									
31	None	8,800	9,280	4,840	2,670	0	1,560	210	0	31
32	1	121,700	117,100	94,830	14,750	240	570	6,350	360	32
33	2	305,600	307,600	267,040	26,550	540	540	12,940	0	33
34	3	315,200	318,930	255,390	41,960	0	840	20,740	0	34
35	4 or more	244,300	242,680	182,000	30,880	270	450	29,080	0	35
36	**Multiunit Structures**	215,400	218,080	207,150	0	0	750	10,010	180	36
	Stories in Structures									
37	1		46,090	45,730	0	0	180	0	180	37
38	2		140,170	136,710	0	0	570	2,890	0	38
39	3		21,690	15,000	0	0	0	6,690	0	39
40	4 to 6		9,040	8,830	0	0	0	210	0	40
41	7 or more		1,090	880	0	0	0	210	0	41
	Metro Status									
42	In central cities		168,440	166,010	0	240	530	1,480	180	42
43	In suburbs		827,160	754,890	0	810	3,440	67,840	180	43
	Mover Status									
44	Moved in last 2 years		189,180	63,180	102,000	0	360	23,470	180	44
45	Not a recent mover		748,320	555,280	151,480	810	1,860	38,710	180	45

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**	937,500	937,500	813,580	58,360	810	2,220	62,170	360	1
	Kitchen									
2	With complete kitchen	923,800	925,150	800,160	60,830	810	2,040	60,950	360	2
3	Lacking complete kitchen facilities	13,800	12,350	210	10,740	0	180	1,220	0	3
	Plumbing									
4	With all plumbing facilities	932,300	932,030	804,930	61,540	810	2,220	62,170	360	4
5	Lack some plumbing	5,200	5,470	0	5,470	0	0	0	0	5
6	No hot piped water	200	210	0	210	0	0	0	0	6
7	No bathtub/shower	0	0	0	0	0	0	0	0	7
8	No flush toilet	0	0	0	0	0	0	0	0	8
	Water									
9	Public/private water	936,900	937,040	796,380	75,100	810	2,220	62,170	360	9
10	Well	200	0	0	0	0	0	0	0	10
11	Other water source	400	460	0	460	0	0	0	0	11
	Sewer									
12	Public sewer	934,500	934,020	808,690	60,160	810	2,040	61,960	360	12
13	Septic tank/cesspool	3,000	3,480	1,290	1,790	0	180	210	0	13
14	**Severe Problems**	13,900	14,050	0	13,830	0	0	210	0	14
15	Plumbing	5,200	5,470	0	5,470	0	0	0	0	15
16	Heating	8,700	8,570	0	8,360	0	0	210	0	16
17	Electric	0	0	0	0	0	0	0	0	17
18	Upkeep	0	0	0	0	0	0	0	0	18
19	Hallways	0	0	0	0	0	0	0	0	19
20	**Moderate problems**	21,000	19,560	1,050	17,110	0	180	1,220	0	20
21	Plumbing	1,800	2,160	0	2,160	0	0	0	0	21
22	Heating	1,000	1,070	0	1,070	0	0	0	0	22
23	Kitchen	13,200	12,350	210	10,740	0	180	1,220	0	23
24	Upkeep	5,000	5,250	210	5,040	0	0	0	0	24
25	Hallways	200	250	0	250	0	0	0	0	25

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**	937,500	937,500	813,580	58,360	810	2,220	62,170	360	1
	Age									
2	Under 65	765,600	765,070	601,030	106,050	810	1,950	55,060	180	2
3	65 or older	172,000	172,430	91,380	73,480	0	270	7,110	180	3
	Children									
4	Some	387,300	391,860	216,310	141,810	270	630	32,650	180	4
5	None	550,200	545,640	359,500	154,320	540	1,590	29,520	180	5
	Race/Origin									
6	White	700,700	698,520	575,140	77,900	810	1,380	43,110	180	6
7	Hispanic	105,600	106,390	57,540	45,620	270	360	2,600	0	7
8	Non-Hispanic	595,100	592,130	461,400	88,480	540	1,020	40,510	180	8
9	Black	13,300	12,980	3,950	6,960	0	0	2,070	0	9
10	Other	223,500	226,000	73,210	134,780	0	840	16,990	180	10
11	Total Hispanics	187,900	192,420	101,370	84,550	270	750	5,310	180	11
	Income Source									
12	Wages and salaries	780,600	779,990	600,040	121,920	810	1,770	55,270	180	12
13	Welfare or SSI	27,500	27,050	4,670	22,110	0	270	0	0	13
14	Social security or pension	199,100	200,150	115,130	76,930	0	0	7,910	180	14

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**	937,500	937,500	813,580	58,360	810	2,220	62,170	360	1
	Tenure									
2	Owner occupied	597,400	600,490	475,250	73,480	540	1,290	49,750	180	2
3	Percent own occupied	63.7%	64.1%	58.4%	NA	66.2%	58.3%	80.0%	50.0%	3
4	Renter occupied	340,200	337,010	260,380	62,840	270	920	12,420	180	4
	Rental Affordability									
5	Non-market		24,640	7,650	15,930	0	0	1,060	0	5
6	Extremely low rent		30,830	10,790	18,990	270	360	420	0	6
7	Very low rent		112,320	63,960	47,340	0	210	640	180	7
8	Low rent		86,120	31,600	53,490	0	180	850	0	8
9	Moderate rent		49,930	10,850	33,880	0	0	5,200	0	9
10	High to very high rent		33,160	10,170	18,560	0	180	4,250	0	10
	Renter Hsd Income									
12	Less than $20,000	67,500	66,300	22,110	41,290	0	570	2,340	0	12
13	$20,000 to $34,999	79,300	78,540	21,370	53,960	270	0	2,760	180	13
14	$35,000 to $59,999	90,700	93,220	22,330	69,020	0	180	1,700	0	14
15	$60,000 to $99,999	65,000	63,220	8,700	53,090	0	0	1,430	0	15
16	$100,000 or more	37,500	35,720	3,570	27,780	0	180	4,190	0	16
	Owner Monthly Housing Costs									
17	Less than $499	118,900	109,490	56,300	51,160	0	180	1,860	0	17
18	$500 to $699	43,400	47,840	7,770	38,460	0	180	1,430	0	18
19	$700 to $999	54,800	51,530	7,460	41,400	0	0	2,500	180	19
20	$1,000 to $1,499	108,300	106,920	32,990	69,430	540	450	3,500	0	20
21	$1,500 or more	272,100	284,710	131,890	111,880	0	490	40,460	0	21
	Owner Hsd Income									
22	Less than $20,000	55,300	53,470	13,210	38,650	0	180	1,430	0	22
23	$20,000 to $34,999	70,300	69,780	13,240	53,320	0	270	2,760	180	23
24	$35,000 to $59,999	110,200	112,070	27,750	77,930	0	180	6,210	0	24
25	$60,000 to $99,999	153,000	158,310	45,710	100,340	0	210	12,050	0	25
26	$100,000 or more	208,800	206,850	59,020	119,550	540	450	27,290	0	26

Rental Market Dynamics[15]

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 Anaheim-Santa Ana in 1994, we cannot distinguish between units in the high-rent and very-high-rent categories, and therefore have collapsed these two categories into one category, high-to-very-high-rent units (column *J*).

Table A shows that there were 334,340 rental units in the Anaheim-Santa Ana metropolitan area in 1994. In 2002, 78,170 of these units were no longer rental; 47,110 were owner-occupied, 26,680 were either vacant or being used seasonally, and 4,380 had been lost to the stock. Taken as a proportion of the units in 1994, movement into owner-occupancy was concentrated in the high-rent and very-high-rent categories, and losses to the stock were concentrated among non-market and extremely-low-rent units.

Table B shows there were 337,010 rental units in the Anaheim-Santa Ana metropolitan area in 2002, of which 76,630 were not rental units in 1994. The new units came from units that had been owner-occupied (30,080), units that had been vacant or in seasonal use (32,750), newly constructed units (12,420), and other additions (1,380). Most of the formerly owner-occupied units went to the very-low-rent and the high-to-very-high-rent categories; most of the newly constructed rental units went to the moderate-rent and high-to-very-high-rent categories.

Looking at both tables, we see that the overall number of rental units was approximately equal in 1994 and 2002. The number of extremely-low-rent and very-low-rent units also stayed even at approximately 140,000 in 1994 and 2002.

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[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.

Table A: Forward-Looking Rental Dynamics Analysis

Forward looking	C Number in 1994	D Non-market in 2002	E Extremely low rent in 2002	F Very low rent in 2002	G Low rent in 2002	H Moderate rent in 2002	J High to very high rent in 2002	K Owner-occupied in 2002	L Vacant or seasonal in 2002	M Lost to stock
Non-market	24,320	7,520	1,140	3,780	2,760	1,630	210	3,590	3,160	520
Extremely low rent	24,190	660	10,610	5,800	1,560	250	770	2,240	1,690	610
Very low rent	117,220	4,230	7,210	62,920	27,330	1,280	0	5,200	7,820	1,230
Low rent	97,680	4,870	2,260	16,230	31,090	20,520	1,550	11,870	8,170	1,130
Moderate rent	40,590	520	620	620	7,000	10,680	4,530	12,200	3,770	650
High to very high rent	30,340	320	410	210	1,050	4,030	10,010	12,010	2,060	240
Column sum	334,340	18,120	22,260	89,560	70,780	38,390	17,070	47,110	26,680	4,380

Table B: Backward-Looking Rental Dynamics Analysis

Backward looking	C Number in 2002	D Non-market in 1994	E Extremely low rent in 1994	F Very low rent in 1994	G Low rent in 1994	H Moderate rent in 1994	J High to very high rent in 1994	K Owner-occupied in 1994	L Vacant or seasonal in 1994	M New construc-tion	N Other additions
Non-market	24,640	7,650	670	4,300	4,950	530	320	2,780	2,390	1,060	0
Extremely low rent	30,830	1,160	10,790	7,330	2,300	630	420	3,940	3,210	420	630
Very low rent	112,320	3,850	5,890	63,960	16,500	630	210	6,440	13,830	640	390
Low rent	86,120	2,810	1,580	27,770	31,600	7,110	1,070	5,320	7,830	850	180
Moderate rent	49,930	1,660	250	1,300	20,850	10,850	4,100	3,800	1,910	5,200	0
High to very high rent	33,160	210	780	0	1,580	4,600	10,170	7,800	3,590	4,250	180
Column sum	337,010	17,340	19,970	104,660	77,770	24,360	16,290	30,080	32,750	12,420	1,380

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 though 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*.