American Housing Survey

Components of Inventory Change And Rental Market Dynamics: Buffalo 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 Buffalo 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 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 Buffalo counted 458,800 occupied units (column B, row 2, Forward-Looking Table 1); the 2002 AHS report counted 461,300 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 Buffalo metropolitan area, the CINCH weights produce population estimates that are very close to the published estimates.

- 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-

[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.

Looking Table 1 estimates that 406,860 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 39,450 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, 1,570 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, no mobile homes were moved out.

- 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, 1,230 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, 7,270 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 extensive damage. Among occupied units, 1,920 units are no longer usable for housing.

[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.

- 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 490 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, no mobile homes were moved in (column F, row 2 of Backward-Looking Table 1).[6]

- Column G is the CINCH estimate of the number of units from column C that had been nonresidential in 1994. Among occupied units, 230 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, 17,620 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, 240 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. In the case of Buffalo, units that would have been classified in row 10 of Forward-Looking Table 1 were placed in another category to preserve the confidentiality of respondents.

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 the older units. Among units built in 1929 or earlier, 5 percent were demolished or destroyed by 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] Column H in the forward-looking table and column G in the backward-looking table show that smaller units in terms of the number of rooms are more likely to move into and out of nonresidential use.

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. In the case of Buffalo, the Census Bureau does not report a number of stories above 6. In general, the published reports contain matching data for row 36 only.

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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.

Rows 42-43 divide the housing stock between central cities units and suburban residences to determine how the observed changes vary by location. In Buffalo, 6 percent of central city units were demolished or destroyed between 1994 and 2002; less than 1 percent of suburban units were demolished or destroyed. Ninety-five percent of all new construction occurred in the suburbs. 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 some continuity over the 8 years with respect to having serious physical problems. Fewer than 14 percent of the units with serious problems in 1994 had serious problems in 2002, and fewer than 8 percent of the units with serious problems in 2002 had serious problems in 1994. Fewer than 6 percent of the units with moderate problems in 1994 still had moderate problems in 2002, and fewer than 4 percent of the units with moderate problems in 2002 had moderate problems in 1994. Fewer than 2 percent of the units had serious problems in either year, and fewer than 5 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. Units occupied by Black householders were 12 times more likely to be demolished or destroyed than units occupied by White householders (8.2 percent versus 0.6 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 Buffalo were 10 times 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).

[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.

- 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 Buffalo there are only three classes, with low-rent, 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]

[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**	503,200	503,200	482,620	0	2,990	0	1,890	11,710	2,890	1,120	1
	Occupancy Status											
2	Occupied	458,800	458,800	406,860	39,450	1,570	0	1,230	7,270	1,920	490	2
3	Vacant	40,600	40,600	10,510	21,990	1,420	0	650	4,430	970	630	3
4	Seasonal	3,800	3,800	2,290	1,510	0	0	0	0	0	0	4
	Units in Structure											
5	1, detached	288,600	291,690	288,270	0	0	0	360	2,360	270	430	5
6	1, attached	12,700	12,700	11,010	0	0	0	620	540	420	110	6
7	2 to 4	149,200	148,950	135,580	0	2,880	0	790	7,230	1,890	580	7
8	5 to 9	23,700	23,870	23,330	0	0	0	110	320	100	0	8
9	10 to 19	7,500	19,340	17,920	0	110	0	0	1,100	210	0	9
10	20 to 49	5,300	0	0	0	0	0	0	0	0	0	10
11	50 or more	7,200	590	590	0	0	0	0	0	0	0	11
12	Mobile Home/trailer	9,000	6,060	5,910	0	0	0	0	150	0	0	12
	Year Built											
14	1990-1994	16,500	15,860	15,740	0	0	0	0	120	0	0	14
15	1985-1989	16,900	16,150	16,150	0	0	0	0	0	0	0	15
16	1980-1984	8,600	8,460	8,460	0	0	0	0	0	0	0	16
17	1970-1979	46,800	45,720	45,720	0	0	0	0	0	0	0	17
18	1960-1969	64,100	62,540	61,960	0	110	0	110	370	0	0	18
19	1950-1959	76,100	77,150	75,910	0	100	0	220	260	520	150	19
20	1940-1949	44,800	46,220	44,350	0	320	0	470	800	160	110	20
21	1930-1939	63,100	62,800	58,760	0	1,100	0	410	1,620	420	490	21
22	1920-1929	58,700	59,450	54,260	0	630	0	260	3,560	740	0	22
23	1919 or earlier	107,600	108,840	101,300	0	730	0	420	4,980	1,040	380	23