

**Components of
Inventory Change
And Rental Dynamics:
Cleveland
1996-2004**

July 2006

Econometrica, Inc. and
ICF Consulting
under contract to:

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

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Acknowledgements

This report was produced by Econometrica, Inc., under Contract No. GS-10F-0269K, Order No. C-CHI-00809, for the U.S. Department of Housing and Urban Development (HUD). Cyrus Baghelai served as Econometrica's Project Director, and the primary analyses and report writing were performed by Frederick J. Eggers and Fouad Moumen. The authors thank David A. Vandembroucke, the HUD Government Technical Representative, for many helpful suggestions and for his assistance in obtaining needed information from the Census Bureau. The authors also thank Barbara Williams of the Census Bureau for her assistance in answering numerous questions.

Components of Inventory Change and Rental Market Dynamics: Cleveland 1996-2004

Overview

Components of Inventory Change (CINCH) and rental market dynamics are two techniques for explaining how changes that take place in a housing market over time 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 rental units that were affordable to low-income households at the beginning of the period?”

This report focuses on the Cleveland metropolitan housing market over the period between 1996 and 2004. It is one of 13 reports based on local American Housing Surveys conducted in 2004; these 13 metropolitan areas were previously surveyed in either 1995 or 1996.¹

CINCH and rental market dynamics have both forward-looking and backward-looking components. The forward-looking component starts with the housing stock available at the beginning of the period and then, looking at the end of the period, attempts 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. The backward-looking component starts with the housing stock available at the end of the period and, looking at the beginning of the period, attempts 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 1996 may have become a medical office in 1997 but returned to being a housing unit in 2000. CINCH would record this unit as having

¹ See <http://www.huduser.org/datasets/cinch.html> for examples of previous CINCH and rental dynamics studies.

undergone no change over the period from 1996 to 2004. In research 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 research in this report uses the AHS, which is a sample of units at both points in time, and previous research has shown that creating sample weights that take both periods into account can generate some inconsistent or inaccurate results. For this reason, recent CINCH and rental market dynamics studies have separated the forward-looking and backward-looking components. This paper will do the same. (Weighting is explained briefly in Appendix B and more fully in a separate paper referenced in that 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 1996 to 2004 and identifying how units were lost to the housing stock; and a set of backward-looking tables tracing where 2004 units came from and distinguishing between units that were part of the stock in 1996 and units that were additions to the stock since 1996.
- Two tables and accompanying discussion that highlight interesting changes in the Cleveland housing stock between 1996 and 2004.
- A brief discussion of the rental market dynamics results using CINCH-like tables.

Two appendices 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 1996 housing stock by 2004. There are three basic dispositions of 1996 units: units that continue to exist in 2004 with the same characteristics (or serving the same market), units that continue to exist in 2004 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 2004 housing stock came from in reference to 1996. There are three basic sources of 2004 units: units that existed in 1996 with the same characteristics (or serving the same market),

units that existed in 1996 but with different characteristics (or serving a different market), and units that are additions to the housing stock.

The essence of the CINCH analysis lies in the columns because they specify the state of a unit in the other time period.

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 1996 AHS report for Cleveland counted 772,300 occupied units (row 2, column B, forward-looking Table 1); the 2004 AHS report counted 769,300 occupied units (row 2, column B, 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 (1996 for the forward-looking tables and 2004 for the backward-looking tables), and (b) satisfying the condition in column A. CINCH uses different weights than those used in preparing the published AHS reports. Therefore, CINCH estimates can differ from AHS estimates for particular subsets of the housing stock. As explained in the appendix, the weights were created to match AHS published totals for rows 2 through 4 of Table 1 and rows 2 and 4 of Table 4. This perfect match will not be true of other rows.²
- 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. Categories for which the CINCH weights seem consistently to have trouble matching the published numbers were: the number of mobile homes, units built between 2000-2004, units built between 1995-1999, rental units that do not have a cash rent, and monthly housing costs less than \$350 for owners. In a few other cases, the weighted numbers consistently fail to match the published totals, but the authors believe the differences result because the Census Bureau created the published totals using information not available on the public use files or because of coding differences. These cases are: the reasons for incomplete plumbing and households receiving welfare or SSI payment.

looking Table 1 estimates that 673,100 of the occupied units from 1996 were also occupied in 2004.

- 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 82,200 units that were occupied in 1996 are still part of the housing stock in 2004 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; these are 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 1996 to 2004.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2004 housing stock because they were merged with other units or converted into multiple units. Among occupied units, 400 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, 200 mobile homes were moved out.³
- Column H is the CINCH estimate of the number of units that 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.⁴ Among occupied units, 1,400 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 2004. In this case, 7,500 units were demolished or destroyed.
- Column J is the CINCH estimate of the number of units from column C that by 2004 were condemned or that were no longer usable for housing because of extensive damage. In Cleveland, 800 occupied units were lost because of damage or similar cause.

³ The AHS does not trace where the mobile home is moved to. The move may be within the metropolitan area or outside the metropolitan area. Similarly, column G in the backward-looking tables does not distinguish between move-ins from within or from outside the metropolitan area.

⁴ 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 2004 for other reasons. These include units that the Census Bureau eliminated for sampling purposes and other miscellaneous losses. Among occupied units, there were 6,600 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.⁵

Columns Unique to Backward-Looking Tables

In backward-looking tables, columns G through K track where units came from that are part of the housing stock in 2004 but were not part of the 1996 housing stock.⁶

- Column G is the CINCH estimate of the number of mobile homes from column C that were moved in during the period. Among occupied units, 600 mobile homes were moved in (row 2, column G, of backward-looking Table 1).⁷
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 1996. Among occupied units, 1,200 had been nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 1996 and 2004. Among occupied units, 22,400 units were newly constructed.
- Column J is the CINCH estimate of the number of units from column C that were added by 2004 by the recovery of units that had been temporarily lost to the housing stock because occupancy was prohibited in 1996, or the interior of the unit was exposed to the elements, or for reasons “not classified.” The 2004 occupied housing stock includes 1,000 recovered units.
- Column K includes units added by the Census Bureau as sample adjustments. Sample adjustments represent 9,300 occupied units in 2004.

⁵ The weighted numbers are rounded to the nearest 100 to match practices used by the Census Bureau in the AHS publications.

⁶ The backward-looking tables do not contain a column F for units added through mergers and conversions. In 2004, the Census Bureau did not code the variable that would normally identify units created from mergers and conversions (REUAD=7 or 8).

⁷ In 2004, the Census Bureau did not code the variable that would normally identify mobile home move-ins (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 (by owner-occupied and renter-occupied), vacant units, and seasonal units.

Rows 5-12 divide the housing stock by type of structure to see what type of units account for losses.⁸ Column E is forced to be zero on the grounds that changes in structure types are extremely rare and that any observed changes are most likely data errors.

Rows 13-24 divide the housing stock by year built.⁹ The published reports use the categories 1990-1994, 1995-1999, and 2000-2004; this report uses the same categories in Backward-Looking Table 1 but uses 1990-1996 for row 15 in Forward-Looking Table 1.¹⁰ Column E is again forced to be zero.

Rows 25-31 and 32-36 divide the housing stock by two different measures of interior space, the number of rooms and the number of bedrooms.¹¹

Rows 37-42 focus on multiunit structures only and divide them by number of stories. Column E is forced to be zero. The published reports contain matching data for row 37 only.

Rows 43-44 divide the housing stock between central cities units and suburban residences to see how the observed changes vary by location. Rows 45-46 divide the housing stock by whether or not the occupants have moved in within the last 2 calendar years to see if certain units consistently have high turnover, and to see if high turnover units are more susceptible to loss.

⁸ 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.

⁹ Rows 13 and 14 are not included in Forward-Looking Table 1, because the 1996 housing stock cannot contain units built after 1996.

¹⁰ We use REUAD=3 and not year built to identify new construction. For this reason, there are units built after 1995 that are not considered new construction. Year built is obtained from the respondent and may be inaccurate.

¹¹ Because of small sample sizes in the losses and additions columns, we combined room categories that the published reports list separately.

Table 2

This table looks at 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 6-9 look at each of these requirements separately.¹² In the 1996 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 6-9 separate out good units from the least desirable units based on kitchen and bath equipment.

Rows 10-15 look at how units obtain water and dispose of sewage.

Rows 16-21 look at units with severe physical problems. Rows 17-21 identify specific types of serious deficiencies. Row 16 counts the units having one or more of these deficiencies. Rows 22-27 look at units with moderate problems. Rows 23-27 identify specific types of deficiencies. Row 22 counts the units having one or more of these deficiencies.¹³ 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.

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. In all cases, the analysis seeks to find out how stable occupancy characteristics are over time, and what part of the market was served by units that were lost between 1996 and 2004.

Rows 2-3 look at the age of the householder. Rows 4-5 look at whether or not the household includes children. Rows 6-11 look at the race or ethnicity of the householder.¹⁴ Rows 12-14 look at three possible sources of household income.

¹² Row 9 is not included in Forward-Looking Table 2, because the public use file does not contain the information needed to identify facilities available “for exclusive use” of the household.

¹³ For definitions of serious and moderate problems, see pages 990 and 991 of the AHS Codebook, version 1.78, at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf.

¹⁴ In compliance with new federal guidelines, the 2004 AHS used different categories for recording race. For 2004, this paper defined “White” as “White only”; Black as “Black only”; and “other” as all other answers.

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 see the extent to which units change tenure characteristics and whether rental or owner-occupied units are more likely to be lost.

Rows 5-10 characterize the rental stock using 6 categories based on monthly housing costs. Row 10 identifies units provided to tenants for no cash rents, e.g., units provided to maintenance or management personnel or units provided to relatives. Rows 16-20 identify owner-occupied units by total monthly housing costs.

Rows 11-15 track rental units by household income; rows 21-25 track owner-occupied units by household income.¹⁵

¹⁵ The published reports list more categories for both monthly housing costs and household income. This report combined categories for two reasons. First, the sample size in each metropolitan area is small, and therefore larger categories provide more stable measurement of the various types of losses and additions. Second, columns D and E track whether the units in each category remain occupied and stay in the same cost or income category. The combined categories create more interesting analysis because bigger changes in monthly housing costs or income are needed to move between broader categories.

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Total	829,600	829,500	805,900	0	1,000	200	2,500	10,600	1,500	7,900	1
	Occupancy Status											
2	Occupied	772,300	772,300	673,100	82,200	400	200	1,400	7,500	800	6,600	2
3	Vacant	56,300	56,300	13,300	36,500	500	0	1,100	2,900	700	1,300	3
4	Seasonal	900	900	200	600	0	0	0	200	0	0	4
	Units in Structure											
5	1, detached	520,200	523,400	516,400	0	0	200	1,200	3,000	200	2,500	5
6	1, attached	35,800	35,500	34,300	0	0	0	0	800	400	0	6
7	2 to 4	113,600	117,100	110,200	0	600	0	900	2,700	600	2,200	7
8	5 to 9	31,500	29,900	28,100	0	200	0	0	1,000	200	400	8
9	10 to 19	34,400	33,500	30,900	0	0	0	0	2,000	200	400	9
10	20 to 49	20,600	18,400	17,100	0	200	0	0	800	0	400	10
11	50 or more	61,300	60,600	58,600	0	0	0	400	400	0	1,200	11
12	Mobile Home/Trailer	12,100	11,100	10,300	0	0	0	0	0	0	800	12
	Year Built											
15	1990-1996	39,000	38,000	37,600	0	0	0	0	200	0	200	15
16	1985-1989	29,800	29,000	28,600	0	0	0	200	0	0	200	16
17	1980-1984	19,700	20,600	20,600	0	0	0	0	0	0	0	17
18	1970-1979	159,200	161,700	157,700	0	200	0	200	1,800	600	1,200	18
19	1960-1969	111,700	108,700	106,000	0	0	0	400	1,200	200	1,000	19
20	1950-1959	140,500	138,800	135,900	0	200	200	400	1,000	0	1,200	20
21	1940-1949	78,900	78,600	75,900	0	200	0	0	1,400	0	1,200	21
22	1930-1939	58,700	58,700	56,500	0	200	0	400	800	200	600	22
23	1920-1929	88,400	88,000	83,700	0	200	0	200	2,100	600	1,200	23
24	1919 or earlier	103,800	107,400	103,500	0	0	0	800	2,100	0	1,100	24

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
	Rooms											
25	1 – 4 rooms	185,100	179,600	139,400	31,800	600	0	900	3,900	400	2,600	25
26	5 rooms	191,600	191,600	93,800	90,900	200	0	400	3,700	400	2,200	26
27	6 rooms	191,700	193,000	89,600	99,100	200	0	400	1,500	200	1,900	27
28	7 rooms	119,600	119,400	48,000	69,900	0	0	200	400	200	800	28
29	8 rooms	82,000	85,800	29,000	55,800	0	200	400	200	200	0	29
30	9 rooms	37,100	36,400	13,900	21,700	0	0	200	400	0	200	30
31	10 rooms or more	22,500	23,700	9,600	13,400	0	0	0	400	200	200	31
	Bedrooms											
32	None	5,800	5,700	2,600	2,600	0	0	0	400	0	0	32
33	1	98,300	93,400	71,300	17,900	200	0	800	2,100	400	800	33
34	2	238,200	235,300	173,900	51,100	800	0	1,000	4,100	400	4,000	34
35	3	332,800	334,800	265,300	62,900	0	0	200	3,100	600	2,700	35
36	4 or more	154,600	160,300	133,200	25,000	0	200	600	800	200	400	36
37	Multiunit Structures	261,400	259,500	244,900	0	1,000	0	1,300	6,800	1,000	4,600	37
	Stories in Structures											
38	1	NA	6,700	5,900	0	0	0	0	400	0	400	38
39	2	NA	36,200	34,800	0	0	0	200	800	200	200	39
40	3	NA	102,600	95,500	0	800	0	700	3,100	600	2,000	40
41	4 to 6	NA	74,700	71,000	0	200	0	0	2,100	200	1,200	41
42	7 or more	NA	39,300	37,700	0	0	0	400	400	0	800	42
	Metro Status											
43	In central cities	NA	216,600	204,100	0	800	0	1,300	6,900	800	2,800	43
44	In suburbs	NA	612,900	601,800	0	200	200	1,200	3,700	800	5,100	44
	Mover Status											
45	Moved in last 2 years	NA	126,000	27,600	94,200	200	0	200	1,600	200	2,000	45
46	Not a Recent Mover	NA	646,300	633,600	0	200	200	1,200	5,900	600	4,600	46

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Occupied Units	772,300	772,300	673,100	82,200	400	200	1,400	7,500	800	6,600	1
	Kitchen											
2	With complete kitchen	762,900	761,800	652,800	92,900	400	200	1,200	7,100	800	6,400	2
3	Lacking complete kitchen facilities	9,400	10,500	1,800	7,800	0	0	200	400	0	200	3
	Plumbing											
4	With all plumbing facilities	753,600	751,300	651,700	83,500	400	200	1,400	7,100	600	6,400	4
5	Lack some plumbing	0	21,000	200	19,900	0	0	0	400	200	200	5
6	No hot piped water	0	200	0	200	0	0	0	0	0	0	6
7	No bathtub/shower	0	200	0	200	0	0	0	0	0	0	7
8	No flush toilet	18,800	21,000	0	20,200	0	0	0	400	200	200	8
	Water											
10	Public/private water	713,600	706,400	611,400	79,400	400	200	1,400	7,300	800	5,400	10
11	Well	55,300	61,500	50,700	9,500	0	0	0	200	0	1,200	11
12	Other water source	3,400	4,400	2,300	2,100	0	0	0	0	0	0	12
	Sewer											
13	Public sewer	693,800	687,400	590,300	81,600	400	200	1,400	7,300	800	5,400	13
14	Septic tank/cesspool	78,400	84,700	69,400	13,900	0	0	0	200	0	1,200	14
15	Other or none	200	200	0	200	0	0	0	0	0	0	15
	Severe Problems											
16	Severe Problems	26,200	28,200	2,100	24,500	200	0	0	1,000	200	200	16
17	Plumbing	18,800	21,000	200	19,900	0	0	0	400	200	200	17
18	Heating	4,500	4,700	200	3,800	200	0	0	400	0	0	18
19	Electric	2,300	2,800	1,400	1,200	0	0	0	200	0	0	19
20	Upkeep	2,400	1,400	0	1,200	0	0	0	0	200	0	20
21	Hallways	200	0	0	0	0	0	0	0	0	0	21
	Moderate problems											
22	Moderate problems	26,400	26,000	1,200	23,100	0	0	200	800	0	600	22
23	Plumbing	2,300	2,800	0	2,400	0	0	0	0	200	200	23
24	Heating	0	200	0	200	0	0	0	0	0	0	24
25	Kitchen	7,000	10,500	1,800	7,800	0	0	200	400	0	200	25
26	Upkeep	16,900	18,000	700	16,300	0	0	0	800	0	200	26
27	Hallways	600	500	0	500	0	0	0	0	0	0	27

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Occupied units	772,300	772,300	673,100	82,200	400	200	1,400	7,500	800	6,600	1
	Age of Householder											
2	Under 65	580,600	579,900	434,500	132,600	400	200	600	6,100	800	4,600	2
3	65 or older	191,900	192,400	103,200	85,000	0	0	800	1,400	0	2,000	3
	Children											
4	Some	254,300	258,300	125,900	125,100	0	200	0	4,100	800	2,200	4
5	None	518,200	514,000	359,300	145,000	400	0	1,400	3,400	0	4,400	5
	Race/Origin of Householder											
6	White	625,000	623,700	519,500	95,800	200	200	1,200	2,200	0	4,600	6
7	Hispanic	11,300	12,300	4,100	7,500	0	0	200	200	0	200	7
8	NonHispanic	613,700	611,400	502,000	101,700	200	200	1,000	2,000	0	4,400	8
9	Black	135,100	135,900	88,800	38,700	0	0	200	5,300	800	2,000	9
10	Other	12,200	12,700	4,100	8,300	200	0	0	0	0	0	10
11	Total Hispanics	15,800	16,800	5,300	10,600	200	0	200	200	0	200	11
	Income Source											
12	Wages and salaries	581,300	578,200	427,000	140,200	200	200	1,200	4,000	400	5,000	12
13	Welfare or SSI	244,100	248,300	132,100	111,500	0	0	600	1,800	0	2,200	13
14	Social security or pension	55,100	56,600	4,800	47,500	200	0	0	2,700	600	800	14

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 95	D 95 units present in 2004	E Changed in characteristics	F 95 units affected by conversion /merger	G 95 mobile homes moved out	H 95 units changed to nonresidential use	I 95 units lost through demolition or disaster	J 95 units badly damaged or condemned	K 95 units lost in other ways	
1	Occupied units	772,300	772,300	673,100	82,200	400	200	1,400	7,500	800	6,600	1
	Tenure											
2	Owner occupied	517,600	517,600	459,700	52,700	0	200	1,000	1,400	0	2,700	2
3	Percent own occpd	67.0%	67.0%									3
4	Renter occupied	254,700	254,700	157,000	86,000	400	0	400	6,200	800	3,900	4
	Renter Monthly Housing Costs											
5	Less than \$350	49,100	52,500	17,200	31,400	200	0	0	2,300	400	1,000	5
6	\$350 to \$599	128,600	126,300	38,100	83,100	200	0	200	3,300	400	1,000	6
7	\$600 to \$799	45,500	47,400	14,700	31,400	0	0	0	600	0	600	7
8	\$800 to \$1,249	15,500	17,500	5,100	11,400	0	0	200	0	0	800	8
9	\$1,250 or more	2,800	0	0	0	0	0	0	0	0	0	9
10	No cash rent	13,100	11,000	2,200	8,500	0	0	0	0	0	400	10
	Renter Hsd Income											
11	Less than \$15,000	91,900	93,100	33,100	54,600	200	0	0	3,500	600	1,000	11
12	\$15,000 to \$29,999	77,500	77,300	14,700	58,300	200	0	400	2,100	200	1,400	12
13	\$30,000 to \$49,999	55,600	54,400	14,300	38,700	0	0	0	400	0	1,000	13
14	\$50,000 to \$99,999	27,200	27,000	4,400	22,200	0	0	0	200	0	200	14
15	\$100,000 or more	2,700	2,900	200	2,400	0	0	0	0	0	200	15
	Owner Monthly Housing Costs											
16	Less than \$350	167,600	168,700	48,800	118,000	0	0	200	600	0	1,200	16
17	\$350 to \$599	109,100	111,500	29,200	81,000	0	0	600	0	0	800	17
18	\$600 to \$799	70,300	75,400	11,200	63,600	0	0	0	200	0	400	18
19	\$800 to \$1,249	112,400	108,000	36,300	70,600	0	200	200	600	0	200	19
20	\$1,250 or more	58,000	53,900	34,700	19,000	0	0	0	0	0	200	20
	Owner Hsd Income											
21	Less than \$15,000	55,500	55,500	17,600	37,500	0	0	0	200	0	200	21
22	\$15,000 to \$29,999	111,800	111,500	25,700	83,800	0	0	200	400	0	1,400	22
23	\$30,000 to \$49,999	125,000	122,300	27,400	93,200	0	200	400	400	0	800	23
24	\$50,000 to \$99,999	172,200	175,700	73,900	100,800	0	0	200	400	0	400	24
25	\$100,000 or more	53,000	52,600	27,700	24,700	0	0	200	0	0	0	25

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Total	856,100	856,100	818,400	0	600	1,200	23,400	1,800	10,800	1
	Occupancy Status										
2	Occupied	769,300	769,300	693,100	41,800	600	1,200	22,400	1,000	9,300	2
3	Vacant	86,400	86,400	12,600	70,500	0	0	1,000	800	1,500	3
4	Seasonal	400	400	100	300	0	0	0	0	0	4
	Units in Structure										
5	1, detached	576,600	579,700	553,400	0	0	400	18,800	700	6,400	5
6	1, attached	42,700	41,600	37,700	0	0	200	3,400	400	0	6
7	2 to 4	79,300	81,000	78,900	0	0	200	0	500	1,400	7
8	5 to 9	30,100	29,400	29,100	0	0	0	200	200	0	8
9	10 to 19	37,300	35,200	33,800	0	0	0	600	0	800	9
10	20 to 49	16,700	16,300	16,100	0	0	0	200	0	0	10
11	50 or more	59,600	59,300	58,500	0	0	400	200	0	200	11
12	Mobile Home/Trailer	13,700	13,600	11,000	0	600	0	0	0	2,000	12
	Year Built										
13	2000-2004	22,800	18,400	1,600	0	200	0	12,100	0	4,500	13
14	1995-1999	34,500	28,100	14,000	0	200	0	11,000	0	3,000	14
15	1990-1994	32,900	31,900	31,500	0	0	0	300	200	0	15
16	1985-1989	37,600	35,800	35,200	0	0	600	0	0	0	16
17	1980-1984	21,700	22,000	22,000	0	0	0	0	0	0	17
18	1970-1979	103,800	104,700	104,300	0	0	200	0	0	200	18
19	1960-1969	118,500	118,700	117,200	0	200	200	0	0	1,100	19
20	1950-1959	141,400	145,600	145,000	0	0	0	0	400	200	20
21	1940-1949	87,700	90,000	89,800	0	0	0	0	200	0	21
22	1930-1939	60,800	63,200	62,900	0	0	200	0	200	0	22
23	1920-1929	96,000	97,100	96,500	0	0	0	0	400	200	23
24	1919 or earlier	98,200	100,600	98,500	0	0	0	0	500	1,600	24

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
	Rooms										
25	1 – 4 rooms	199,700	197,300	139,400	51,000	400	800	2,400	800	2,500	25
26	5 rooms	173,700	174,500	95,100	72,400	200	200	3,600	500	2,400	26
27	6 rooms	185,900	187,700	91,600	89,200	0	0	4,200	500	2,300	27
28	7 rooms	134,000	133,900	49,100	77,000	0	0	6,300	0	1,500	28
29	8 rooms	79,700	80,100	29,700	47,000	0	0	2,300	0	1,100	29
30	9 rooms	47,100	47,300	14,200	29,500	0	200	2,900	0	400	30
31	10 rooms or more	36,100	35,300	9,800	23,200	0	0	1,700	0	600	31
	Bedrooms										
32	None	3,600	4,000	2,600	1,100	0	0	200	0	200	32
33	1	91,900	88,800	71,500	14,600	0	800	700	200	1,000	33
34	2	224,000	225,500	175,200	42,600	400	200	4,200	900	2,000	34
35	3	340,800	341,900	271,600	56,000	200	0	8,300	500	5,200	35
36	4 or more	195,900	195,900	136,800	46,500	0	200	10,000	200	2,300	36
37	Multiunit Structures	223,000	221,200	216,300	0	0	600	1,200	700	2,400	37
	Stories in Structures										
38	1	NA	7,600	7,600	0	0	0	0	0	0	38
39	2	NA	69,100	66,300	0	0	200	400	200	2,000	39
40	3	NA	65,500	64,100	0	0	400	600	200	200	40
41	4 to 6	NA	42,600	41,800	0	0	0	200	300	200	41
42	7 or more	NA	36,500	36,500	0	0	0	0	0	0	42
	Metro Status										
43	In central cities	NA	210,100	205,500	0	200	600	1,800	1,600	400	43
44	In suburbs	NA	646,000	613,000	0	400	600	21,500	200	10,400	44
	Mover Status										
45	Moved in last 2 years	NA	134,600	26,100	98,600	200	400	5,100	400	3,800	45
46	Not a Recent Mover	NA	634,700	504,400	105,800	400	800	17,200	600	5,500	46

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Occupied Units	769,300	769,300	693,100	41,800	600	1,200	22,400	1,000	9,300	1
	Kitchen										
2	With complete kitchen	752,500	752,500	672,200	47,100	600	1,000	21,800	1,000	8,900	2
3	Lacking complete kitchen facilities	16,800	16,800	1,900	13,700	0	200	600	0	400	3
	Plumbing										
4	With all plumbing facilities	763,500	763,100	671,100	57,800	600	1,200	22,400	1,000	9,100	4
5	Lack some plumbing	5,800	6,200	200	5,800	0	0	0	0	200	5
6	No hot piped water	500	500	0	500	0	0	0	0	0	6
7	No bathtub/shower	200	200	0	200	0	0	0	0	0	7
8	No flush toilet	500	500	0	500	0	0	0	0	0	8
9	No exclusive use	5,200	5,500	0	5,300	0	0	0	0	200	9
	Water										
10	Public/private water	709,500	703,700	629,500	47,500	600	1,200	19,200	1,000	4,800	10
11	Well	56,400	62,500	52,300	2,600	0	0	3,100	0	4,500	11
12	Other water source	3,400	3,100	2,400	700	0	0	0	0	0	12
	Sewer										
13	Public sewer	686,200	683,500	607,800	49,900	400	1,000	19,300	1,000	4,200	13
14	Septic tank/cesspool	82,900	85,500	71,500	5,500	200	200	3,100	0	5,100	14
15	Other	200	200	0	200	0	0	0	0	0	15
	Severe Problems										
16	Severe Problems	13,900	13,900	2,200	10,200	200	0	700	0	600	16
17	Plumbing	5,800	6,200	200	5,800	0	0	0	0	200	17
18	Heating	5,000	4,800	200	4,000	200	0	200	0	200	18
19	Electric	2,700	2,700	1,400	500	0	0	600	0	200	19
20	Upkeep	800	700	0	700	0	0	0	0	0	20
21	Hallways	0	0	0	0	0	0	0	0	0	21
	Moderate problems										
22	Moderate problems	29,300	29,300	1,200	27,500	0	400	200	0	0	22
23	Plumbing	200	700	0	700	0	0	0	0	0	23
24	Heating	700	700	0	700	0	0	0	0	0	24
25	Kitchen	13,500	16,800	1,900	13,700	0	200	600	0	400	25
26	Upkeep	14,700	16,600	700	15,700	0	200	0	0	0	26
27	Hallways	200	500	0	500	0	0	0	0	0	27

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Occupied units	769,300	769,300	693,100	41,800	600	1,200	22,400	1,000	9,300	1
	Age of Householder										
2	Under 65	582,700	580,100	447,000	103,600	400	600	19,400	1,000	8,200	2
3	65 or older	186,600	189,200	106,400	77,900	200	600	3,000	0	1,100	3
	Children										
4	Some	247,500	250,800	129,500	105,700	0	400	9,900	800	4,600	4
5	None	521,800	518,500	370,100	129,700	600	800	12,400	200	4,700	5
	Race/Origin of Householder	0									
6	White	609,400	608,200	535,100	43,400	600	1,000	19,400	0	8,700	6
7	Hispanic	18,800	19,200	4,300	14,500	0	200	100	0	200	7
8	Non-Hispanic	590,700	588,900	516,900	42,800	600	800	19,300	0	8,500	8
9	Black	139,400	140,900	91,300	45,700	0	200	2,100	1,000	600	9
10	Other	20,500	20,200	4,500	14,900	0	0	800	0	0	10
11	Total Hispanics	21,300	21,900	5,500	15,900	0	200	100	0	200	11
	Income Source										
12	Wages and salaries	582,900	581,100	402,300	149,700	400	600	19,500	1,000	7,600	12
13	Welfare or SSI	238,600	241,600	136,200	98,800	400	600	3,700	0	1,900	13
14	Social security or pension	41,600	20,700	4,900	15,800	0	0	0	0	0	14

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

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

	A Characteristics	B Published Numbers	C Present in 2004	D 04 units present in 95	E Changed in characteristics	G 04 mobile homes moved in	H 04 units derived from nonresidential use	I 04 units added through new construction	J 04 units added from temporary losses	K 04 units added by other means	
1	Occupied units	769,300	769,300	693,100	41,800	600	1,200	22,400	1,000	9,300	1
	Tenure										
2	Owner occupied	545,500	545,500	473,800	43,200	400	200	19,900	200	7,900	2
3	Percent own occpd	70.9%	70.9%								3
4	Renter occupied	223,800	223,800	161,300	56,600	200	1,000	2,500	800	1,400	4
	Renter Monthly Housing Costs										
5	Less than \$350	25,000	27,700	17,600	9,400	200	0	0	400	0	5
6	\$350 to \$599	69,700	66,600	39,100	25,800	0	600	500	200	400	6
7	\$600 to \$799	64,600	65,300	15,200	48,200	0	200	800	200	800	7
8	\$800 to \$1,249	38,300	40,500	5,200	34,500	0	0	800	0	0	8
9	\$1,250 or more	9,300	10,300	0	9,900	0	200	200	0	0	9
10	No cash rent	16,700	13,300	2,200	10,700	0	0	200	0	200	10
	Renter Hsd Income										
11	Less than \$15,000	76,100	76,200	34,000	39,100	200	800	700	400	1,000	11
12	\$15,000 to \$29,999	58,900	59,500	15,200	42,700	0	0	800	400	400	12
13	\$30,000 to \$49,999	54,900	53,400	14,700	37,800	0	200	800	0	0	13
14	\$50,000 to \$99,999	27,000	28,100	4,500	23,600	0	0	0	0	0	14
15	\$100,000 or more	6,800	6,700	200	6,200	0	0	200	0	0	15
	Owner Monthly Housing Costs										
16	Less than \$350	92,900	79,100	50,300	27,400	200	0	400	0	800	16
17	\$350 to \$599	124,700	126,900	30,100	94,800	200	0	1,500	0	400	17
18	\$600 to \$799	63,800	68,700	11,600	53,600	0	200	1,500	200	1,700	18
19	\$800 to \$1,249	133,000	127,100	37,400	84,500	0	0	3,400	0	1,700	19
20	\$1,250 or more	131,000	143,700	35,800	91,400	0	0	13,100	0	3,400	20
	Owner Hsd Income										
21	Less than \$15,000	63,500	62,700	18,200	43,400	200	0	600	0	400	21
22	\$15,000 to \$29,999	76,200	76,200	26,500	45,500	200	200	2,000	0	1,900	22
23	\$30,000 to \$49,999	105,900	105,700	28,200	72,500	0	0	2,900	200	1,900	23
24	\$50,000 to \$99,999	186,000	188,600	76,200	103,300	0	0	6,300	0	2,800	24
25	\$100,000 or more	114,100	112,200	28,600	74,600	0	0	8,100	0	900	25

Changes in the Cleveland Housing Stock: 1996-2004

Forward-looking Table 5 looks at how losses affected certain portions of the Cleveland housing stock. The rows were selected because of their inherent interest or because an examination of losses in all 13 metropolitan areas showed that these categories typically had high loss rates. In most cases, if a category had a high loss rate, then a category with the opposite characteristic would have a low loss rate, e.g., units with 1-4 rooms and units with 10 or more rooms.

Forward-Looking Table 5: Selected Loss Rates

Category	Based on Columns in Tables 1-4		
	All Losses 1996-2004 (F+G+H+I+J+K)/C	Permanent Losses (I/C)	Potentially Reversible Losses (F+G+H+J+K)/C
All units¹⁶	2.9%	1.3%	1.6%
Vacant units	11.5%	5.2%	6.4%
Units in structures with 2-4 units	6.0%	2.3%	3.7%
Units in structures with 5-9 units	6.0%	3.3%	2.7%
Mobile homes/trailers	7.2%	0.0%	7.2%
Units built 1930-1939	3.7%	1.4%	2.4%
Units built 1920-1929	4.9%	2.4%	2.5%
Units built in 1919 or earlier	3.7%	2.0%	1.8%
Units with 1-4 rooms	4.7%	2.2%	2.5%
Units with no bedrooms	7.0%	7.0%	0.0%
Units in central cities	5.8%	3.2%	2.6%
Units outside of central city	1.8%	0.6%	1.2%
Occupied units¹⁷	2.2%	1.0%	1.2%
Units with severe problems	5.7%	3.5%	2.1%
Units with moderate problems	6.2%	3.1%	3.1%
Units with a White householder	1.3%	0.4%	1.0%
Units with a Black householder	6.1%	3.9%	2.2%
Units with Hispanic householder	4.8%	1.2%	3.6%
Household receives welfare/SSI	7.6%	4.8%	2.8%
Owner-occupied units	1.0%	0.3%	0.8%
Renter-occupied units	4.6%	2.4%	2.2%
Renter-occupied – monthly housing costs less than \$350	7.4%	4.4%	3.0%
Renter-occupied – household income less than \$15,000	5.7%	3.8%	1.9%

¹⁶ All the rows above “Occupied units” refer to portions of the entire housing stock.

¹⁷ All the rows below “Occupied units” refer to portions of the occupied housing stock.

Components of Inventory Change and Rental Market Dynamics:
Cleveland 1996–2004

By 2004, 2.9 percent of the units in the 1996 housing stock was no longer part of the housing stock; 1.3 percent were permanent losses—that is, the units had either been demolished or destroyed by fire or natural disasters—while 1.6 percent were lost in ways that could be reversed, such as nonresidential use.

Units that were vacant in 1996 had a loss rate more than 4 times greater than the overall loss rate. Units in small structures and mobile homes also had high loss rates. Units built prior to 1940 and small units had higher than average loss rates. The central city loss rate was more than 3 times the loss rate in the rest of the metropolitan area.

Among units occupied in 1996, 2.2 percent were lost by 2004. The loss rate was higher for units with physical problems; over 3 percent of these units were permanent losses by 2004. The loss rates for units occupied by Black or Hispanic householders were more than 3 to 4 times the rate of those occupied by White householders. Units with households on welfare or SSI had very high loss rates compared to all occupied units.

The loss rate among rental units was more than 4 times the loss rate among owner-occupied units. Low-cost rental units and rental units occupied by the lowest income households had high loss rates.

Backward-looking Table 5 presents addition rates for selected areas of the Cleveland housing stock. The rows were selected because of their inherent interest or because an examination of additions in all 13 metropolitan areas showed that these categories typically had high addition rates. In most cases, if a category had a high addition rate, then a category with the opposite characteristic would have a low addition rate, e.g., units with 10 or more rooms and units with no bedrooms.

Of all the units in the Cleveland housing stock in 2004, 4.4 percent were not in the 1996 housing stock. New construction accounted for 2.7 percent of the additions; the return to the housing stock of units that were not available in 1996 accounted for 1.7 percent.

Single units in attached structures and mobile homes had higher than average addition rates. Large units also had higher than average addition rates. The addition rate in central cities was less than one-half of the addition rate in the rest of the metropolitan area, and there was little new construction in the central city.

Almost all the new construction was accounted for by owner-occupied units rather than renter-occupied units, and by units occupied by White householders rather than units occupied by Black or Hispanic householders. The addition rates were high for owner-occupied units with monthly housing costs greater than \$1,250 and owner-occupied units with households with income of \$100,000 or more.

Backward-Looking Table 5: Selected Addition Rates

Category	Based on Columns in Tables 1-4		
	All Additions (G+H+I+J+K)/C	New Construction I/C	Other Additions G+H+J+K/C
All units ¹⁸	4.4%	2.7%	1.7%
Single-unit, attached structure	9.6%	8.2%	1.4%
Mobile homes/trailers	19.1%	0.0%	19.1%
Units with 9 rooms	7.4%	6.1%	1.3%
Units with 10 or more rooms	6.5%	4.8%	1.7%
Units with no bedrooms	10.0%	5.0%	5.0%
Units in central cities	2.2%	0.9%	1.3%
Units outside of central city	5.1%	3.3%	1.8%
Occupied units ¹⁹	4.5%	2.9%	1.6%
Units with a white householder	4.9%	3.2%	1.7%
Units with a Black householder	2.8%	1.5%	1.3%
Units with Hispanic householder	2.3%	0.5%	1.8%
Owner-occupied units	5.2%	3.6%	1.6%
Renter-occupied units	2.6%	1.1%	1.5%
Renter-occupied – monthly housing costs \$800 to \$1,249	2.0%	2.0%	0.0%
Owner-occupied – monthly housing costs \$1,250 or more	11.5%	9.1%	2.4%
Owner-occupied – household income \$100,000 or more	8.0%	7.2%	0.8%

Rental Market Dynamics

Tables A and B present the rental market dynamics analysis. Rental market dynamics differs from the analysis in rows 5-10 in the forward-looking and backward-looking tables in two ways. First, rental market dynamics uses categories (rows) based on affordability instead of absolute dollar amount. Affordability is defined relative to local area median income measured at the same time that monthly housing costs are measured. Tables A and B use the following seven categories:

- Non-market (either no cash rent or a subsidized rent).
- Extremely low rent (monthly housing costs affordable to renters with incomes less than or equal to 30 percent of local area median income).²⁰

¹⁸ All the rows above “Occupied units” refer to portions of the entire housing stock.

¹⁹ All the rows below “Occupied units” refer to portions of the occupied housing stock.

²⁰ “Affordable” is defined as monthly housing costs less than or equal to 30 percent of the highest income in the category.

Components of Inventory Change and Rental Market Dynamics:
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Table A: Forward-Looking Rental Dynamics Analysis, Counts: 1996-2004

Affordability Groups	A Total in 1996	B Non- Market in 2004	C Extremely Low Rent in 2004	D Very Low Rent in 2004	E Low Rent in 2004	F Moderate Rent in 2004	G High Rent in 2004	H Very or Extremely High Rent in 2004	I Owner Occupied in 2004	J Seasonal or Vacant in 2004	K Lost to Stock in 2004
Non-market	40,800	14,500	5,300	4,700	1,200	700	0	0	3,600	7,300	3,500
Extremely Low Rent	22,000	2,400	3,600	3,900	700	500	0	0	1,500	8,000	1,400
Very Low Rent	110,800	5,100	9,200	46,200	6,300	3,600	1,200	0	8,600	26,400	4,300
Low Rent	40,000	1,200	700	16,400	4,800	1,000	200	0	6,500	8,000	1,000
Moderate Rent	30,600	500	0	4,100	7,700	3,600	0	2,400	6,300	5,300	600
High Rent	10,300	0	0	1,200	500	2,200	0	1,200	2,900	1,500	800
Very or Extremely High Rent	200	0	0	0	0	0	0	0	200	0	0
Total	254,700	23,700	18,900	76,500	21,300	11,600	1,500	3,600	29,600	56,300	11,700

Table B: Backward-Looking Rental Dynamics Analysis, Counts: 2004-1996

Affordability Groups	A Total in 2004	B Non- Market in 1996	C Extremely Low Rent in 1996	D Very Low Rent in 1996	E Low Rent in 1996	F Moderate Rent in 1996	G High Rent in 1996	H Very or Extremely High Rent in 1996	I Owner Occupied in 1996	J Seasonal or Vacant in 1996	K New Construc- tion	L Other Additions
Non-market	38,500	14,900	2,500	5,200	1,200	500	0	0	9,700	3,500	200	800
Extremely Low Rent	25,500	5,500	3,700	9,400	700	0	0	0	2,000	3,700	0	400
Very Low Rent	99,100	4,800	4,000	47,400	16,900	4,200	1,200	0	5,200	12,400	900	2,000
Low Rent	30,300	1,200	700	6,500	5,000	7,900	500	0	4,000	3,700	800	0
Moderate Rent	19,300	700	500	3,700	1,000	3,700	2,200	0	4,500	2,700	200	0
High Rent	4,400	0	0	1,200	200	0	0	0	2,000	700	200	0
Very or Extremely High Rent	6,600	0	0	0	0	2,500	1,200	0	1,700	700	200	200
Total	223,800	27,200	11,400	73,500	25,100	18,900	5,200	0	29,100	27,600	2,500	3,400

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- Very low rent (monthly housing costs affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income).
- Low rent (monthly housing costs affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income).
- Moderate rent (monthly housing costs affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income).
- High rent (monthly housing costs affordable to renters with incomes greater than 80 percent but less than or equal to 100 percent of local area median income).
- Very high rent or extremely high rent (monthly housing costs affordable to renters with incomes greater than 100 percent of local area median income).²¹

The second difference is that rental market dynamics uses different columns in order to highlight changes in availability and affordability. Columns A through H duplicate the rows so that one can trace how rental units change their affordability status. Columns I and J track movement into or out of the owner-occupied stock or the seasonal or vacant stock, respectively. In Table A, the various types of losses are combined in column K, while, in Table B, new construction is recorded in column K and all other additions in column L.

Table A shows that there were 254,700 rental units in the Cleveland metropolitan area in 1996. In 2004, 97,600 of those units were no longer rental; 29,600 were owner-occupied, 56,300 were either vacant or being used seasonally, and 11,700 had been lost to the stock. Taken as a proportion of the units in 1996, movement into owner-occupancy was high among units in the three highest rent categories, and losses to the stock were high among non-market units and extremely low rent units.

Table B shows there were 223,800 rental units in the Cleveland metropolitan area in 2004, of which 62,600 were not rental units in 1996. The new units came from units that had been owner-occupied (29,100), units that had been vacant or in seasonal use (27,600), newly constructed units (2,500), and other additions (3,400). One-third of the formerly owner-occupied units went to the non-market category, while the very low rent, low rent, and moderate rent categories accounted for almost half; most of the 2,500 newly constructed rental units went to the very low rent and low rent categories.

Looking at both tables, we see that the overall number of rental units decreased by approximately 30,000 units. The number of extremely low rent and very low rent units combined also decreased by approximately 10,000 units, making Cleveland one of only 2

²¹ Ideally this final category would be two separate categories with a boundary of 120 percent of local area median income. However, the Census Bureau uses top coding of variables to prevent data users from being able to identify specific units. At the metropolitan area level, top coding of the variables used to calculate housing costs results in monthly housing costs never exceeding the 120-percent boundary in one or both years.

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areas among the 13 metropolitan areas studied with a decline in the number of units affordable to the lowest income households.

Like all of the areas studied, there was considerable movement into and out of the rental stock; the gross flows sum to 160,000 units. Tables A and B also show that there was considerable movement by individual units across the affordability categories.

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) equaled the number of units present in the base year (column C). In every case, exact equality was achieved prior to rounding.
- Throughout the tables, various sets of rows are related to each other. For example, the year-built rows (13-24) 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, exact equality was achieved prior to 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. Footnote 2 indicates where the CINCH weights or coding used for individual rows does not seem to produce the same results as the published estimates.

Appendix B – Weighting

CINCH separates the AHS samples in 1996 and 2004 into three components: units that exist and are part of the housing stock in both years (SAMES), units that are part of the 1996 housing stock but are not part of the 2004 housing stock (LOSSES), and units that are not part of the 1996 housing stock but are part of the 2004 housing stock (ADDITIONS). ADDITIONS are segmented into NEW CONSTRUCTION and RECOVERIES (structures that existed in 1996 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 1996 and those ADDITIONS that were interviewed in 2004.

For the forward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 1996 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted count in 1996 of LOSSES to create weights for interviewed LOSSES. We then adjusted the weights of SAMES and LOSSES to equal the AHS published totals for owner-occupied units, renter-occupied units, vacant units, and seasonal units in 1996.

For the backward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 2004 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted counts in 2004 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 owner-occupied units, renter-occupied units, vacant units, and seasonal units in 2004.

The logic behind the weighting and the procedures used to create the weights are explained in *Weighting Strategy for 2004 Metropolitan CINCH and Rental Dynamics Analysis*.