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American Housing Survey

Components of Inventory Change and Rental Dynamics: Minneapolis-St. Paul 1998-2007

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American Housing Survey

**Components of Inventory Change
and Rental Dynamics:
Minneapolis-St. Paul 1998–2007**

Prepared for:
U.S. Department of Housing & Urban Development
Office of Policy Development & Research

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Components of Inventory Change and Rental Market Dynamics: Minneapolis-St. Paul 1998–2007

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?”¹

This report focuses on the Minneapolis-St. Paul metropolitan housing market over the period between 1998 and 2007. It is one of seven reports based on local American Housing Surveys (AHS) conducted in 2007; these seven metropolitan areas were previously surveyed in either 1998 or 2002.

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 using 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 1998 may have become a medical office in 2003 but returned to being a housing unit in 2006. CINCH would record this unit as having undergone no change over the period from 1998 to 2007. In research jargon, CINCH and rental market dynamics are *comparative static* analyses.

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

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 efforts have learned 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 five sections:

- A discussion of some data issues that complicate the 1998–2007 comparisons for the Minneapolis-St. Paul metropolitan area.
- 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 1998 to 2007 and identifying how units were lost to the housing stock, and a set of backward-looking tables tracing where 2007 units came from and distinguishing between units that were part of the stock in 1998 and units that were additions to the stock since 1998.
- Two tables, and accompanying discussion, that highlight interesting changes in the Minneapolis-St. Paul housing stock between 1998 and 2007.
- A brief discussion of the rental market dynamics results, using CINCH-like tables.

There are two appendices:

- Appendix A explains how the results were tested.
- Appendix B explains how the weights were created.

Data Issues Affecting the Analyses

The AHS underwent three changes between 1998 and 2007 that complicate the CINCH and rental dynamics analyses in this paper:

- In 2007, the U.S. Department of Housing and Urban Development (HUD) reduced the sample sizes of both the national and metropolitan AHS surveys because of its reduced research budget. In 1998, the AHS sample for Minneapolis-St. Paul contained 4,796 housing units; the 2007 sample contained only 2,847 housing units.
- In 2005, the Census Bureau replaced approximately half of the manufactured housing units (mobile homes) in the AHS samples—both national and metropolitan—with newly sampled units to improve the coverage of mobile homes constructed before 2000.
- In 2007, the Census Bureau revised the geography used for four of the six metropolitan areas. The Minneapolis-St. Paul geography did not change between the 1998 and 2007 surveys.

For housing units that existed in 1998 and 2007, CINCH and rental dynamic analyses can use only those sample units whose householders were interviewed in both years. Decreases in sample sizes, the dropping and adding of mobile home units to the sample, and changes in geography combine with difficulties in obtaining interviews to reduce substantially the useable sample. The forward-looking CINCH analysis for Minneapolis-St. Paul uses a sample of 1,846 units, of which only 14 are mobile homes; the backward-looking CINCH analysis uses a sample of 2,211, of which only 17 are mobile homes. The small sample sizes, particularly the paucity of mobile homes, limited the extent to which the weighting algorithms could be controlled to published counts of important segments of the Minneapolis-St. Paul housing stock. Comparisons between forward-looking estimates and counts published in the 1998 AHS report are less accurate than similar comparisons between estimates based on the backward-looking weights and counts published in the 2007 AHS report. Additionally, these limitations resulted in particularly poor estimates involving the mobile home component of the housing stock.

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 1998 housing stock by 2007. There are three basic dispositions of 1998 units: (1) units that continue to exist in 2007 with the same characteristics (or serving the same market); (2) units that continue to exist in 2007, but with different characteristics (or serving a different market); or (3) units that were lost to the stock.

The backward-looking tables are concerned with where the 2007 housing stock came from in reference to 1998. There are three basic sources of 2007 units: (1) units that existed in 1998 with the same characteristics (or serving the same market); (2) units that existed in 1998 but with different characteristics (or serving a different market); or (3) 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 Forward-Looking Table 1 focuses on occupied units; row 15 focuses on units built in 1995 through 2000.

- 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 1998 AHS report for Minneapolis-St. Paul counted 1,111,900 occupied units (row 2, column B, Forward-Looking Table 1); the 2007 AHS report counted 1,229,900 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 (1998 for the forward-looking tables and 2007 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-Looking Table 1 estimates that 1,031,600 of the occupied units from 1998 were also occupied in 2007.
- 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 32,800 units that were occupied in 1998 are still part of the housing stock in 2007 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 1998 to 2007.

- Column F is the CINCH estimate of the number of units from column C that are not in the 2007 housing stock because they were merged with other units or converted into multiple units. In the Minneapolis-St. Paul metropolitan area, 2,100 units were lost to mergers or conversions between 1998 and 2007.
- Column G is the CINCH estimate of the number of mobile homes or houses from column C that were moved out during the period. In the Minneapolis-St. Paul metropolitan area, no houses or mobile homes were moved out between 1998 and 2007.³
- 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

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 to have trouble matching the published numbers for most of the seven metropolitan areas were: the number of mobile homes, units built after 2007, rental units that do not have a cash rent, and monthly housing costs less than \$350 for owners.

³ The small sample sizes probably account for the absence of losses due to mobile homes or houses being moved out.

business rather than residential purposes.⁴ Among occupied units, 4,100 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 2007. In this case, 4,800 units were demolished or destroyed from the total housing stock.
- Column J is the CINCH estimate of the number of units from column C that by 2007 were condemned or that were no longer usable for housing because of extensive damage. In the Minneapolis-St. Paul metropolitan area, 1,300 units are recorded as having been temporarily lost because of damage or similar cause.
- Column K is the CINCH estimate of the number of units from column C that were lost by 2007 for other reasons. Among occupied units, there were 3,900 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 F through K track where units came from that are part of the housing stock in 2007 but were not part of the 1998 housing stock.

- Column F is the CINCH estimate of the number of units created through mergers and conversions (splitting one unit into multiple units). Of the entire housing stock in the Minneapolis-St. Paul metropolitan area, 2,100 units were created through mergers or splits.
- Column G is the CINCH estimate of the number of mobile homes included in the count in column C that were moved in during the period. None of the housing units in the 2007 housing stock were mobile homes moved in after 1998.⁶
- Column H is the CINCH estimate of the number of units from column C that had been nonresidential in 1998. Among occupied units, 6,200 had been nonresidential.
- Column I is the CINCH estimate of the number of units from column C that were newly constructed between 1998 and 2007. Among occupied units, 148,600 units were newly constructed.
- Column J is the CINCH estimate of the number of units from column C that were added by 2007 due to the recovery of units that had been temporarily lost to the housing stock because occupancy was prohibited in 1998, or the interior of the unit was exposed to the elements, or for reasons “not classified.” The 2007 occupied housing stock includes 600 recovered units.

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.

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

⁶ There is a problem in the 2007 AHS public use file with the variable for “reason unit added” (REUAD), and therefore it is not possible to determine whether any houses were moved in during this period.

- Column K includes units added by the Census Bureau for other reasons. Of the entire housing stock in the Minneapolis-St. Paul metropolitan area, 8,000 were added for other reasons.

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 nonseasonal 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. 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 13–26 divide the housing stock by year built.⁷ Column E is forced to be zero because units cannot change year built. The reader will note that in Backward-Looking Table 1 there is an apparent anomaly, namely units reported as newly constructed (Column I) that have year-built dates that are inconsistent with being newly constructed. Backward-Looking Table 1 calls a unit newly constructed if the unit was added to the sample in 2007 from a listing of new construction permits. The table bases year built on information provided by the surveyed household.⁸ In some cases, the apparent anomaly is the result of an error—either the respondent answered the question incorrectly or the Census Bureau recorded the answer incorrectly. However, in many cases, the apparent anomaly is not really an anomaly. If an existing housing unit is remodeled to the extent that the local jurisdiction requires the contractor to draw a “new construction” permit, then the unit becomes eligible for inclusion in the AHS as a “newly constructed” unit. In these cases, when the Census Bureau questions the household about the age of the unit, the respondent may very well give the date of construction of the original unit and not the date of the remodeling. In recent years, there has been a substantial number of existing units that have been gutted and totally remodeled, often with a substantial increase in the area of the ground floor, the so-called unit “footprint.” Sometimes local jurisdictions base the decision on whether a “new construction” permit is required on changes in the footprint.

Rows 27–33 and 34–38 divide the housing stock by two different measures of interior space, the number of rooms and the number of bedrooms.⁹

⁷ Rows 13 and 14 are not included in Forward-Looking Table 1 because the 1998 housing stock cannot contain units built after 1998.

⁸ New construction is based on a value of “3” for the variable REUAD (reason unit added), whereas year built is based on answers to the variable BUILT.

⁹ Because of small sample sizes in the losses and additions columns, we combined room categories that the published reports list separately.

Rows 39–44 focus on multi-unit structures only and divide them by number of stories. Column E is forced to be zero. 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 use data file, whereas the published tables contain estimates for these multiunit classes. In Minneapolis-St. Paul, units in structures with 4 or more stories are listed in row 43 instead of rows 43–44 in forward-looking Table 1 because of suppression.

Rows 45–46 divide the housing stock between central cities units and suburban residences to see how the observed changes vary by location. Rows 47–48 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.

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, 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. 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.¹⁰

Rows 16–20 look at units with severe physical problems. Rows 17–20 identify specific types of serious deficiencies. Row 16 counts the units having one or more of these deficiencies.¹¹ Rows 21–25 look at units with moderate problems. Rows 22–25 identify specific types of deficiencies. Row 21 counts the units having one or more of these deficiencies.¹² These rows are in the analysis to answer two questions: (1) whether poor quality units in one year are also poor quality units in the other year; and (2) whether poorer quality units are more likely to be lost.

Table 3

This table studies 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

¹⁰ Row 15 (sewage disposal = other or none) is omitted in the backward-looking tables because the 2007 AHS publications report no housing units with this characteristic in any of the metropolitan areas.

¹¹ Row 19 (severe electrical problems) is omitted from the backward-looking tables because the 2007 AHS publications report no housing units with this characteristic in any of the metropolitan areas.

¹² For definitions of severe and moderate problems see pages 1042 and 1043 of the AHS Codebook, version 1.78, at http://www.huduser.org/intercept.asp?loc=/Datasets/ahs/AHS_Codebook.pdf.

how stable occupancy characteristics are over time and what part of the market was served by units that were lost or added between 1998 and 2007.

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.¹³ Rows 12–14 look at three possible sources of household income.

Table 4

Table 4 studies 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 or added.

Rows 5–10 analyze the rental stock using 6 categories based on monthly housing costs. Row 5 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.¹⁴

¹³ In compliance with new Federal guidelines, the 2007 AHS used different categories for recording race. For 2007, “white” was defined as “white only”; Black as “Black only”; and “other” as all other answers, including householders of more than one race.

¹⁴ 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.

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

	A Characteristics	B Published Numbers	C Present in 98	D 98 units present in 2007	E Changed in characteristics	F 98 units affected by conversion /merger	G 98 units moved out	H 98 units changed to nonresidential use	I 98 units lost through demolition or disaster	J 98 units badly damaged or condemned	K 98 units lost in other ways	
1	Total	1,150,300	1,150,400	1,134,300	0	2,100	0	4,100	4,800	1,300	3,900	1
	Occupancy Status											
2	Occupied	1,111,900	1,111,900	1,011,500	84,300	2,100	0	4,100	4,800	1,300	3,900	2
3	Vacant	35,600	35,600	7,300	28,300	0	0	0	0	0	0	3
4	Seasonal	2,900	2,900	2,200	700	0	0	0	0	0	0	4
		3.1%										
	Units in Structure											
5	1, detached	748,200	761,200	753,400	0	700	0	2,700	2,000	600	1,800	5
6	1, attached	80,000	85,100	85,100	0	0	0	0	0	0	0	6
7	2 to 4	67,900	71,000	66,800	0	0	0	700	2,100	700	700	7
8	5 to 9	28,900	24,500	23,100	0	700	0	0	0	0	700	8
9	10 to 19	53,200	55,700	55,700	0	0	0	0	0	0	0	9
10	20 to 49	69,300	66,700	64,700	0	700	0	700	700	0	0	10
11	50 or more	74,700	65,900	65,200	0	0	0	0	0	0	700	11
12	Mobile Home/Trailer	28,100	20,300	20,300	0	0	0	0	0	0	0	12
	Year Built											
15	1995-2000	59,500	61,100	60,700	0	0	0	0	0	0	500	15
16	1990-1994	94,200	91,400	90,000	0	0	0	1,400	0	0	0	16
17	1985-1989	121,500	128,300	127,600	0	0	0	0	0	0	700	17
18	1980-1985	86,700	98,600	98,600	0	0	0	0	0	0	0	18
19	1975-1979	98,700	94,800	94,800	0	0	0	0	0	0	0	19
20	1970-1974	111,600	100,000	97,900	0	700	0	0	1,400	0	0	20
21	1960-1969	152,600	161,000	157,000	0	0	0	1,300	600	700	1,400	21
22	1950-1959	148,900	158,800	155,400	0	700	0	700	700	0	1,300	22
23	1940-1949	57,300	51,300	51,300	0	0	0	0	0	0	0	23
24	1930-1939	32,700	33,600	33,000	0	0	0	0	0	600	0	24
25	1920-1929	59,800	53,700	53,000	0	0	0	700	0	0	0	25
26	1919 or earlier	126,700	117,800	115,000	0	700	0	0	2,100	0	0	26

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

	A Characteristics	B Published Numbers	C Present in 98	D 98 units present in 2007	E Changed in characteristics	F 98 units affected by conversion /merger	G 98 units moved out	H 98 units changed to nonresidential use	I 98 units lost through demolition or disaster	J 98 units badly damaged or condemned	K 98 units lost in other ways	
	Rooms											
27	1 - 4 rooms	328,400	312,400	243,200	60,900	700	0	1,400	3,400	600	2,100	27
28	5 rooms	169,400	182,300	93,400	84,700	700	0	1,400	700	700	700	28
29	6 rooms	170,900	177,100	81,900	95,200	0	0	0	0	0	0	29
30	7 rooms	194,400	187,500	75,500	111,600	0	0	0	0	0	500	30
31	8 rooms	140,800	148,500	51,900	96,000	0	0	600	0	0	0	31
32	9 rooms	77,900	76,400	22,900	51,500	0	0	700	700	0	600	32
33	10 rooms or more	68,500	66,300	22,400	43,200	700	0	0	0	0	0	33
	Bedrooms											
34	None	3,800	1,200	0	600	0	0	0	0	0	700	34
35	1	174,300	166,400	123,900	39,700	0	0	700	1,400	0	700	35
36	2	322,000	329,900	238,100	84,200	1,400	0	2,100	2,000	1,300	700	36
37	3	378,700	387,100	285,100	99,300	0	0	1,300	700	0	700	37
38	4 or more	271,400	265,800	193,600	69,700	700	0	0	700	0	1,100	38
39	Multiunit Structures Stories in Structures	294,000	283,800	275,400	0	1,400	0	1,400	2,800	700	2,100	39
40	1	NA	14,200	13,500	0	0	0	700	0	0	0	40
41	2	NA	60,000	57,200	0	700	0	700	1,400	0	0	41
42	3	NA	160,400	156,300	0	700	0	0	1,400	700	1,400	42
43	4 to 6	NA	49,200	48,500	0	0	0	0	0	0	700	43
44	7 or more	NA										44
	Metropolitan status											
45	In central cities	NA	280,700	276,600	0	700	0	0	0	1,300	2,100	45
46	In suburbs	NA	869,700	857,600	0	1,400	0	4,100	4,800	0	1,800	46
	Mover status											
47	Moved in last 2 years	NA	248,700	70,300	170,300	700	0	700	3,500	0	3,200	47
48	Not a Recent Mover	NA	863,200	714,100	141,100	1,400	0	3,400	1,300	1,300	600	48

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

	A Characteristics	B Published Numbers	C Present in 98	D 98 units present in 2007	E Changed in characteristics	F 98 units affected by conversion /merger	G 98 units moved out	H 98 units changed to nonresidential use	I 98 units lost through demolition or disaster	J 98 units badly damaged or condemned	K 98 units lost in other ways	
1	Occupied Units	1,111,900	1,111,900	1,011,500	84,300	2,100	0	4,100	4,800	1,300	3,900	1
	Kitchen											
2	Complete kitchen	1,091,700	1,094,100	991,100	88,300	2,100	0	4,100	4,800	1,300	2,500	2
3	Not complete kitchen	20,200	17,800	0	16,400	0	0	0	0	0	1,400	3
	Plumbing											
4	With all plumbing	1,105,700	1,105,800	996,400	94,000	2,100	0	4,100	4,800	1,300	3,200	4
5	Lack some plumbing	6,100	6,100	0	5,400	0	0	0	0	0	700	5
6	No hot piped water	1,900	700	0	0	0	0	0	0	0	700	6
7	No bathtub/shower	2,500	700	0	0	0	0	0	0	0	700	7
8	No flush toilet	2,500	700	0	0	0	0	0	0	0	700	8
9	No exclusive use	3,200	5,400	0	5,400	0	0	0	0	0	0	9
	Water											
10	Public/private water	994,900	993,100	896,500	82,900	2,100	0	3,400	3,500	1,300	3,400	10
11	Well	116,500	118,800	108,400	8,000	0	0	700	1,300	0	500	11
12	Other water source	400	0	0	0	0	0	0	0	0	0	12
	Sewer											
13	Public sewer	989,300	986,300	890,900	81,000	2,100	0	3,400	4,200	1,300	3,400	13
14	Septic tank/cesspool	121,800	125,600	104,500	19,300	0	0	700	600	0	500	14
15	Other or none	800	0	0	0	0	0	0	0	0	0	15
											0	
16	Severe Problems	12,000	9,400	0	8,700	0	0	0	0	0	700	16
17	Plumbing	6,100	6,100	0	5,400	0	0	0	0	0	700	17
18	Heating	5,600	4,000	0	4,000	0	0	0	0	0	0	18
19	Electric	300	0	0	0	0	0	0	0	0	0	19
20	Upkeep	300	0	0	0	0	0	0	0	0	0	20
	Moderate problems	42,400	38,400	2,100	35,600	0	0	0	0	0	700	21
22	Plumbing	1,900	0	0	0	0	0	0	0	0	0	22
23	Heating	0	0	0	0	0	0	0	0	0	0	23
24	Kitchen	18,300	17,800	0	16,400	0	0	0	0	0	1,400	24
25	Upkeep	23,100	22,600	1,400	21,200	0	0	0	0	0	0	25

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

	A Characteristics	B Published Numbers	C Present in 98	D 98 units present in 2007	E Changed in characteristics	F 98 units affected by conversion /merger	G 98 units moved out	H 98 units changed to nonresidential use	I 98 units lost through demolition or disaster	J 98 units badly damaged or condemned	K 98 units lost in other ways	
1	Occupied units	1,111,900	1,111,900	1,011,500	84,300	2,100	0	4,100	4,800	1,300	3,900	1
	Age of Householder											
2	Under 65	933,900	935,900	779,800	144,000	2,100	0	1,300	4,200	1,300	3,200	2
3	65 or older	177,900	176,000	87,800	84,100	0	0	2,800	600	0	700	3
	Children											
4	Some	411,900	413,900	220,900	186,200	1,400	0	700	2,100	700	1,900	4
5	None	699,900	698,000	503,700	184,900	700	0	3,400	2,700	600	2,000	5
	Race/Origin of Householder											
6	White	1,015,800	1,015,800	879,500	121,500	1,400	0	4,100	4,800	600	3,900	6
7	Hispanic	13,000	12,200	3,000	9,100	0	0	0	0	0	0	7
8	NonHispanic	1,002,800	1,003,600	847,600	141,300	1,400	0	4,100	4,800	600	3,900	8
9	Black	46,600	44,800	19,900	24,200	0	0	0	0	700	0	9
10	Other	49,500	51,300	24,800	25,800	700	0	0	0	0	0	10
11	Total Hispanics	19,100	17,300	6,100	11,100	0	0	0	0	0	0	11
	Income Source											
12	Wages and salaries	939,100	865,400	680,500	174,200	2,100	0	2,000	3,500	1,300	1,800	12
13	Social security or pension	231,800	227,500	105,500	117,300	0	0	2,800	600	600	700	13
14	Welfare or SSI	41,800	40,200	6,200	32,600	0	0	0	0	700	700	14

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

	A Characteristics	B Published Numbers	C Present in 98	D 98 units present in 2007	E Changed in characteristics	F 98 units affected by conversion /merger	G 98 units moved out	H 98 units changed to nonresidential use	I 98 units lost through demolition or disaster	J 98 units badly damaged or condemned	K 98 units lost in other ways	
1	Occupied units	1,111,900	1,111,900	1,011,500	84,300	2,100	0	4,100	4,800	1,300	3,900	1
	Tenure											
2	Owner occupied	812,400	812,400	735,200	74,200	0	0	600	600	600	1,100	2
3	Pct owner-occupied	73.1%	73.1%									3
4	Renter occupied	299,500	299,500	214,600	71,700	2,100	0	3,500	4,200	700	2,800	4
	Renter Monthly Housing Costs											
5	No cash rent	5,300	7,600	2,100	4,100	0	0	1,400	0	0	0	5
6	Less than \$350	44,500	42,000	12,400	26,200	0	0	700	700	0	2,100	6
7	\$350 to \$599	112,800	106,000	14,500	88,800	700	0	0	2,100	0	0	7
8	\$600 to \$799	80,400	86,900	13,100	68,200	1,400	0	1,400	1,400	700	700	8
9	\$800 to \$1249	49,200	55,600	24,100	31,500	0	0	0	0	0	0	9
10	\$1,250 or more	7,300	1,400	700	700	0	0	0	0	0	0	10
	Renter Hsd Income											
11	Less than \$15,000	86,500	89,800	22,000	62,900	0	0	2,100	1,400	0	1,400	11
12	\$15,000 to \$29,999	102,200	88,100	17,900	67,500	0	0	0	700	700	1,400	12
13	\$30,000 to \$49,999	72,400	75,600	15,000	56,400	1,400	0	700	2,100	0	0	13
14	\$50,000 to \$99,999	31,500	39,800	9,600	28,700	700	0	700	0	0	0	14
15	\$100,000 or more	6,900	6,200	0	6,200	0	0	0	0	0	0	15
	Owner Monthly Housing Costs											
16	Less than \$350	172,500	147,600	13,200	134,500	0	0	0	0	0	0	16
17	\$350 to \$599	118,500	123,600	27,700	95,300	0	0	0	0	600	0	17
18	\$600 to \$799	124,800	115,800	8,300	106,900	0	0	0	600	0	0	18
19	\$800 to \$1249	256,400	272,700	45,400	225,700	0	0	600	0	0	1,100	19
20	\$1,250 or more	140,100	152,600	118,600	33,900	0	0	0	0	0	0	20
	Owner Hsd Income											
21	Less than \$15,000	57,800	53,500	6,700	46,800	0	0	0	0	0	0	21
22	\$15,000 to \$29,999	97,000	97,600	21,500	76,100	0	0	0	0	0	0	22
23	\$30,000 to \$49,999	177,600	173,500	32,100	140,800	0	0	0	600	0	0	23
24	\$50,000 to \$99,999	331,600	338,500	137,900	199,000	0	0	600	0	0	1,100	24
25	\$100,000 or more	148,300	149,300	90,600	58,100	0	0	0	0	600	0	25

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

	A Characteristics	B Published Numbers	C Present in 2007	D 2007 units present in 1998	E Changed in characteristics	F Units from mergers & splits	G Units moved in	H Units derived from nonresidential use	I Units added through new construction	J Units added from temporary losses	K Units added by other means	
1	Total	1,329,700	1,329,700	1,147,200	0	2,100	0	7,200	164,600	600	8,000	1
	Occupancy Status											
2	Occupied	1,229,900	1,229,900	1,031,600	32,800	2,100	0	6,200	148,600	600	8,000	2
3	Vacant	95,200	95,200	7,300	71,900	0	0	500	15,500	0	0	3
4	Seasonal	4,600	4,600	1,800	1,800	0	0	500	500	0	0	4
	Units in Structure											
5	1, detached	828,000	849,800	756,000	0	500	0	1,800	90,900	0	600	5
6	1, attached	140,000	132,600	83,400	0	0	0	600	48,600	0	0	6
7	2 to 4	62,400	62,300	61,300	0	500	0	0	400	0	0	7
8	5 to 9	24,600	22,000	21,000	0	0	0	0	1,000	0	0	8
9	10 to 19	53,400	56,200	56,200	0	0	0	0	0	0	0	9
10	20 to 49	72,200	71,300	65,600	0	0	0	1,200	3,400	600	500	10
11	50 or more	115,800	112,100	81,800	0	1,000	0	2,300	20,200	0	6,900	11
12	Mobile Home/Trailer	33,300	23,300	22,000	0	0	0	1,300	0	0	0	12
	Year Built											
13	2005-2007	29,200	27,200	0	0	0	0	0	27,200	0	0	13
14	2000-2005	116,400	100,100	0	0	0	0	0	100,100	0	0	14
15	1995-2000	99,600	88,000	62,300	0	700	0	100	23,700	600	700	15
16	1990-1994	92,400	94,500	91,900	0	0	0	600	2,000	0	0	16
17	1985-1989	127,700	135,400	130,300	0	500	0	1,100	2,200	0	1,300	17
18	1980-1985	103,700	105,600	100,500	0	0	0	1,100	1,400	0	2,600	18
19	1970-1979	209,500	206,900	196,600	0	300	0	2,500	6,000	0	1,300	19
21	1960-1969	150,500	158,500	155,400	0	0	0	600	1,300	0	1,200	21
22	1950-1959	150,500	156,800	156,800	0	0	0	0	0	0	0	22
23	1940-1949	51,100	53,200	53,200	0	0	0	0	0	0	0	23
24	1930-1939	33,100	31,700	31,700	0	0	0	0	0	0	0	24
25	1920-1929	53,300	54,500	53,800	0	0	0	0	700	0	0	25
26	1919 or earlier	112,500	117,300	114,700	0	500	0	1,100	0	0	900	26

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

	A Characteristics	B Published Numbers	C Present in 2007	D 2007 units present in 1998	E Changed in characteristics	F Units from mergers & splits	G Units moved in	H Units derived from nonresidential use	I Units added through new construction	J Units added from temporary losses	K Units added by other means	
	Rooms											
27	1 - 4 rooms	341,600	332,800	239,400	47,200	1,500	0	5,900	30,100	600	8,000	27
28	5 rooms	235,500	234,900	94,500	108,100	0	0	700	31,600	0	0	28
29	6 rooms	232,100	234,900	83,200	121,400	0	0	0	30,200	0	0	29
30	7 rooms	211,400	211,900	77,300	106,300	0	0	500	27,800	0	0	30
31	8 rooms	166,500	173,000	53,000	97,900	500	0	0	21,600	0	0	31
32	9 rooms	84,900	85,400	23,500	49,900	0	0	0	11,900	0	0	32
33	10 rooms or more	57,600	56,800	23,100	22,300	0	0	0	11,300	0	0	33
	Bedrooms											
34	None	15,300	13,800	0	12,000	0	0	0	1,100	0	700	34
35	1	160,100	154,400	121,400	12,700	1,000	0	3,000	10,400	600	5,200	35
36	2	359,900	353,300	238,500	64,100	500	0	3,700	44,400	0	2,100	36
37	3	465,500	480,200	292,000	128,600	0	0	0	59,600	0	0	37
38	4 or more	328,900	327,900	198,300	79,500	500	0	500	49,000	0	0	38
39	Multiunit Structures Stories in Structures	328,400	324,000	285,900	0	1,500	0	3,500	25,100	600	7,400	39
40	1	NA	7,800	6,600	0	0	0	0	900	0	300	40
41	2	NA	61,400	60,200	0	500	0	0	100	0	500	41
42	3	NA	181,600	167,900	0	700	0	1,800	10,200	600	300	42
43	4 to 6	NA	38,200	25,400	0	300	0	0	9,500	0	2,900	43
44	7 or more	NA	34,900	25,700	0	0	0	1,700	4,300	0	3,300	44
	Metropolitan status											
45	In central cities	NA	298,900	277,300	0	1,400	0	1,700	14,900	0	3,500	45
46	In suburbs	NA	1,030,800	869,900	0	700	0	5,500	149,600	600	4,500	46
	Mover status											
47	Moved in last 2 years	NA	221,000	70,800	106,800	300	0	600	41,700	0	900	47
48	Not a Recent Mover	NA	1,008,900	730,300	156,500	1,700	0	5,600	106,900	600	7,100	48

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

	A Characteristics	B Published Numbers	C Present in 2007	D 2007 units present in 1998	E Changed in characteristics	F Units from mergers & splits	G Units moved in	H Units derived from nonresidential use	I Units added through new construction	J Units added from temporary losses	K Units added by other means	
1	Occupied Units	1,229,900	1,229,900	1,031,600	32,800	2,100	0	6,200	148,600	600	8,000	1
	Kitchen											
2	Complete	1,218,900	1,220,100	1,010,900	46,000	1,500	0	6,200	147,500	600	7,400	2
3	No complete	11,000	9,800	0	7,500	500	0	0	1,100	0	700	3
	Plumbing											
4	With all	1,217,600	1,217,500	1,016,200	36,900	2,100	0	6,200	147,500	600	8,000	4
5	Lack some	12,300	12,400	0	11,300	0	0	0	1,100	0	0	5
6	No hot piped	600	700	0	700	0	0	0	0	0	0	6
7	No	600	0	0	0	0	0	0	0	0	0	7
8	No flush toilet	600	0	0	0	0	0	0	0	0	0	8
9	No exclusive use	11,100	11,700	0	10,600	0	0	0	1,100	0	0	9
	Water											
10	Public/private	1,099,600	1,096,000	913,500	36,000	2,100	0	6,200	129,500	600	8,000	10
11	Well	130,200	133,900	111,100	3,800	0	0	0	19,100	0	0	11
12	Other water	0	0	0	0	0	0	0	0	0	0	12
	Sewer											
13	Public sewer	1,098,900	1,099,100	908,000	46,500	2,100	0	6,200	128,000	600	7,700	13
14	Septic	131,000	130,800	107,300	2,500	0	0	0	20,600	0	300	14
	Severe											
16	Severe	19,100	19,500	0	18,400	0	0	0	1,100	0	0	16
17	Plumbing	12,300	12,400	0	11,300	0	0	0	1,100	0	0	17
18	Heating	5,100	5,200	0	5,200	0	0	0	0	0	0	18
20	Upkeep	1,700	1,900	0	1,900	0	0	0	0	0	0	20
	Moderate											
21	Moderate	17,800	14,300	2,100	9,400	500	0	0	1,600	0	700	21
22	Plumbing	1,400	1,400	0	1,400	0	0	0	0	0	0	22
23	Heating	600	500	0	0	0	0	0	500	0	0	23
24	Kitchen	9,300	9,800	0	7,500	500	0	0	1,100	0	700	24
25	Upkeep	6,400	6,700	1,400	5,300	0	0	0	0	0	0	25

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

	A Characteristics	B Published Numbers	C Present in 2007	D 2007 units present in 1998	E Changed in characteristics	F Units from mergers & splits	G Units moved in	H Units derived from nonresidential use	I Units added through new construction	J Units added from temporary losses	K Units added by other means	
1	Occupied units	1,229,900	1,229,900	1,031,600	32,800	2,100	0	6,200	148,600	600	8,000	1
	Age											
2	Under 65	1,040,000	1,037,000	795,300	103,700	1,100	0	5,000	129,800	0	2,100	2
3	65 or older	189,800	192,900	89,500	75,900	1,000	0	1,200	18,800	600	5,900	3
	Children											
4	Some	435,100	441,600	226,600	145,700	500	0	1,200	67,600	0	0	4
5	None	794,800	788,300	511,700	180,500	1,500	0	5,000	81,000	600	8,000	5
	Race/Origin											
6	White	1,085,800	1,087,800	897,100	48,700	1,500	0	5,000	127,200	600	7,700	6
7	Hispanic	36,400	34,800	3,100	28,100	0	0	0	3,700	0	0	7
8	NonHispanic	1,049,400	1,053,000	864,800	49,800	1,500	0	5,000	123,600	600	7,700	8
9	Black	72,100	72,000	20,000	42,300	0	0	600	8,800	0	300	9
10	Other	71,900	70,100	25,500	30,800	500	0	600	12,600	0	0	10
11	Total Hispanics	45,200	43,800	6,300	32,200	500	0	600	4,200	0	0	11
	Income Source											
12	Wages and salaries	996,400	996,800	475,800	388,800	1,100	0	3,800	125,800	0	1,500	12
13	Social security or pension	226,800	229,400	107,700	87,900	1,000	0	1,200	26,100	0	5,500	13
14	Welfare or SSI	31,200	34,500	6,200	24,700	0	0	600	2,700	0	300	14

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

	A Characteristics	B Published Numbers	C Present in 2007	D 2007 units present in 1998	E Changed in characteristics	F Units from mergers & splits	G Units moved in	H Units derived from nonresidential use	I Units added through new construction	J Units added from temporary losses	K Units added by other means	
1	Occupied units	1,229,900	1,229,900	1,031,600	32,800	2,100	0	6,200	148,600	600	8,000	1
	Tenure											
2	Owner occupied	908,500	908,500	751,400	35,300	1,100	0	700	118,300	0	1,700	2
3	Percent owner-occupied	73.9%	73.9%									3
4	Renter occupied	321,400	321,400	214,600	63,100	1,000	0	5,500	30,300	600	6,300	4
	Renter Monthly Housing Costs											
5	No cash rent	14,400	15,200	2,100	11,700	0	0	600	900	0	0	5
6	Less than \$350	34,800	31,900	12,400	11,700	300	0	1,800	3,400	600	1,700	6
7	\$350 to \$599	44,100	41,200	14,500	23,400	0	0	1,300	1,700	0	300	7
8	\$600 to \$799	74,600	72,900	13,100	56,600	0	0	600	2,300	0	300	8
9	\$800 to \$1,249	107,100	112,900	24,100	75,700	0	0	1,200	9,600	0	2,300	9
10	\$1,250 or more	46,300	47,300	700	31,800	700	0	0	12,400	0	1,700	10
	Renter Hsd Income											
11	Less than \$15,000	69,000	69,400	22,000	36,500	700	0	1,800	5,500	600	2,300	11
12	\$15,000 to \$29,999	79,100	76,500	17,900	50,600	0	0	1,200	4,800	0	2,000	12
13	\$30,000 to \$49,999	78,800	78,000	15,000	58,000	0	0	600	4,500	0	0	13
14	\$50,000 to \$99,999	77,900	81,500	9,600	57,800	300	0	1,900	9,900	0	1,900	14
15	\$100,000 or more	16,500	16,000	0	10,300	0	0	0	5,600	0	0	15
	Owner Monthly Housing Costs											
16	Less than \$350	42,500	31,000	13,300	15,400	0	0	0	2,000	0	300	16
17	\$350 to \$599	138,300	120,900	28,300	86,300	0	0	0	6,000	0	300	17
18	\$600 to \$799	52,800	68,000	8,300	54,200	0	0	500	4,700	0	300	18
19	\$800 to \$1,249	162,700	147,100	46,300	87,000	0	0	0	13,000	0	800	19
20	\$1,250 or more	512,200	541,500	121,300	326,400	1,100	0	100	92,600	0	0	20
	Owner Hsd Income											
21	Less than \$15,000	34,900	33,000	6,800	23,100	0	0	0	2,800	0	300	21
22	\$15,000 to \$29,999	81,400	81,400	22,000	51,400	0	0	0	7,100	0	900	22
23	\$30,000 to \$49,999	122,500	119,300	32,500	74,700	0	0	0	11,600	0	500	23
24	\$50,000 to \$99,999	351,300	355,900	141,000	172,400	1,100	0	100	41,300	0	0	24
25	\$100,000 or more	318,400	318,900	92,600	170,200	0	0	500	55,500	0	0	25

Changes in the Minneapolis-St. Paul Housing Stock: 1998–2007

Forward-Looking Table 5 looks at how losses affected certain portions of the Minneapolis-St. Paul housing stock. The rows were selected because of their inherent interest or because an examination of losses in all seven metropolitan areas showed that these categories typically had high loss rates or rates that varied substantially across the metropolitan areas. 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 in central cities compared to units in the remainder of the metropolitan area.

Forward-Looking Table 5: Selected Loss Rates

Category	Based on columns in Tables 1-4		
	All losses 1998-2007 (F+G+H+I+J+K)/C	Permanent losses (I/C)	Potentially reversible losses (F+G+H+J+K)/C
All units¹⁵	1.4%	0.4%	1.0%
Vacant units	0.0%	0.0%	0.0%
Units in structures with 2-4 units	5.9%	2.9%	2.9%
Units in structures with 5-9 units	5.7%	0.0%	5.7%
Units built 1930-1939	1.8%	0.0%	1.8%
Units built 1920-1929	1.3%	0.0%	1.3%
Units built in 1919 or earlier	2.4%	1.8%	0.6%
Units with 1-4 rooms	2.6%	1.1%	1.5%
Units with no bedrooms	55.7%	0.0%	55.7%
Units in central cities	1.5%	0.0%	1.5%
Units outside of central city	1.4%	0.6%	0.8%
Occupied units¹⁶	1.5%	0.4%	1.0%
Units with severe problems	7.4%	0.0%	7.4%
Units with moderate problems	1.8%	0.0%	1.8%
Units with a white householder	1.5%	0.5%	1.0%
Units with a Black householder	1.6%	0.0%	1.6%
Units with Hispanic householder	0.0%	0.0%	0.0%
Household receives welfare/SSI	1.2%	0.4%	0.8%
Owner-occupied units	0.4%	0.1%	0.3%
Renter-occupied units	4.4%	1.4%	3.0%
Renter-occupied – monthly housing costs less than \$350	8.3%	1.7%	6.6%
Renter-occupied – household income less than \$15,000	5.4%	1.6%	3.9%

¹⁵ All the rows above “Occupied units” refer to portions of the entire housing stock.

¹⁶ All the rows below “Occupied units” refer to portions of the occupied housing stock.

By 2007, 1.4 percent of the units in the 1998 housing stock were no longer part of the housing stock; 0.4 percent were permanent losses, that is, the units had either been demolished or destroyed by fire or natural disasters, while 1.0 percent were lost in ways that could be reversed, such as nonresidential use.

There were no reported losses among units that were vacant in 1998. Units in structures containing 2 to 4 units and in buildings containing 5 to 9 units had substantially higher loss rates. Units built prior to 1940 had a mix of loss rates. Those built between 1930 and 1939 had a loss rate of 1.8 percent, while those built between 1920 and 1929 had a loss rate of 1.3 percent and those built in 1919 or earlier had a loss rate of 2.4 percent. The astoundingly high loss rate for units with no bedrooms should be ignored because of a very small sample size. The central city and suburban loss rates were almost identical.

Among units occupied in 1998, 1.5 percent were lost by 2007. The loss rate was very high for units with severe physical problems; units with moderate physical problems had a 1.8-percent loss rate. Units with white householders and units with Black householders had approximately the same loss rates.

The loss rate among rental units was more than 10 times the loss rate among owner-occupied units. Low rent units and rental units occupied by the lowest income households had high loss rates.

Permanent losses were particularly high among units in structures with 2 to 4 units and low rent units. Potentially reversible losses were high among low rent units and units in buildings with 5 to 9 units.

Backward-Looking Table 5 presents addition rates for selected segments of the Minneapolis-St. Paul housing stock. The rows were selected because of their inherent interest or because an examination of additions in all seven metropolitan areas showed that these categories typically had high addition rates or rates that varied substantially across the metropolitan areas. 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 in central cities compared to units in the remainder of the metropolitan area.

Of all the units in the Minneapolis-St. Paul housing stock in 2007, 13.7 percent were not in the 1998 housing stock. The majority of the new units came from new construction; the return to the housing stock of units that were not available in 1998 accounted for only 1 in 10 of the additions to the stock.

Vacant units had somewhat higher than average rates of overall additions and additions through new construction. Single units in attached structures, as well as units in structures containing 50 or more units, had substantially high rates of additions. Units with 10 or more rooms had a higher than average rate. The addition rate in central cities was slightly less than one-half the addition rate in the rest of the metropolitan area. Both new construction and other additions were much stronger outside of the central cities than in the central cities.

Backward-Looking Table 5: Selected Addition Rates

Category	Based on columns in Tables 1-4		
	All additions (F+G+H+I+J+K)/C	New construction I/C	Other additions (F+G+H+J+K)/C
All units ¹⁷	13.7%	12.4%	1.3%
Vacant units	16.8%	16.3%	0.5%
Single-unit, attached structure 37.1%		36.6%	0.5%
Units in structures with 50 or more units	27.1%	18.0%	9.1%
Units with 10 or more rooms	20.0%	20.0%	0.0%
Units with no bedrooms	13.0%	8.2%	4.8%
Units in central cities	7.2%	5.0%	2.2%
Units outside of central city	15.6%	14.5%	1.1%
Occupied units ¹⁸	13.5%	12.1%	1.4%
Owner-occupied units	13.4%	13.0%	0.4%
Renter-occupied units	13.6%	9.4%	4.2%
Renter-occupied - no cash rent	9.7%	5.8%	3.9%
Renter-occupied - monthly housing costs less than \$350	24.6%	10.8%	13.8%
Renter-occupied - monthly housing costs \$1,250 or more	31.2%	26.3%	4.9%
Owner-occupied - monthly housing costs \$1,250 or more	17.3%	17.1%	0.2%
Owner-occupied - household income \$100,000 or more	17.6%	17.4%	0.2%

The rate of new additions was approximately the same for owner-occupied units and renter-occupied units. Addition rates were high at both ends of the rental stock. Total additions and new construction were also high for owner-occupied units with monthly housing costs greater than \$1,250 and owner-occupied units with households that had income of \$100,000 or more.

Rental Market Dynamics

Tables A and B present the rental market dynamics analysis. Rental market dynamics differs in two ways from the analysis in rows 5–10 in Table 4 of both the forward-looking and backward-looking tables. 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 eight 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)
- 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)

¹⁷ All the rows above “Occupied units” refer to portions of the entire housing stock.

¹⁸ All the rows below “Occupied units” refer to portions of the occupied housing stock.

- 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 (monthly housing costs affordable to renters with incomes greater than 100 percent but less than or equal to 120 percent of local area median income)¹⁹
- extremely high rent (monthly housing costs affordable to renters with incomes greater than 120 percent of local area median income)

The second difference is that rental market dynamics uses different columns in order to highlight changes in availability and affordability. Columns *A* through *I* duplicate the rows so that one can trace how rental units change their affordability status. Columns *J* and *K* 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 *L*, while, in Table B, new construction is recorded in column *L* and all other additions in column *M*.

Table A shows that there were 313,500 rental units in the Minneapolis-St. Paul metropolitan area in 1998. In 2007, 70,600 of these units were no longer rental; 49,900 were owner-occupied; 7,400 were either vacant or being used seasonally; and 13,200 had been lost to the stock. Taken as a proportion of the units in 1998, movement into owner-occupancy was fairly even across the six categories for which forward-looking data are available, and losses to the stock were concentrated among extremely low rent units.

¹⁹ Top-coding of data on rents explains why there were no units in the very high and extremely high rent categories in 1998. In Table A, this shows up as vacant rows and in Table B as vacant columns.

Table A: Forward-Looking Rental Dynamics Analysis, Counts: 1998-2007

Affordability groups	<i>A</i> Total in 1998	<i>B</i> Non- Market in 2007	<i>C</i> Extremely Low Rent in 2007	<i>D</i> Very Low Rent in 2007	<i>E</i> Low Rent in 2007	<i>F</i> Moderate Rent in 2007	<i>G</i> High Rent in 2007	<i>H</i> Very High Rent in 2007	<i>I</i> Extremely High Rent in 2007	<i>J</i> Owner Occupied in 2007	<i>K</i> Seasonal or Vacant in 2007	<i>L</i> Lost to Stock in 2007
Non-market	50,700	27,400	3,400	4,800	4,100	1,400	0	0	0	6,700	1,400	1,400
Extremely Low Rent	24,900	2,100	700	8,300	700	700	700	0	0	5,500	0	6,300
Very Low Rent	154,400	8,600	10,700	80,400	11,700	6,100	4,100	0	0	23,000	5,500	4,200
Low Rent	43,000	2,600	1,400	12,000	14,300	2,600	700	0	0	8,000	0	1,400
Moderate Rent	33,200	1,400	3,300	4,100	8,100	6,900	700	700	700	6,700	600	0
High Rent	7,400	0	1,400	1,400	600	3,400	700	0	0	0	0	0
Very High Rent	0	0	0	0	0	0	0	0	0	0	0	0
Extremely High Rent	0	0	0	0	0	0	0	0	0	0	0	0
Total	313,500	42,100	20,900	111,000	39,500	21,100	6,900	700	700	49,900	7,400	13,200

Table B: Backward-Looking Rental Dynamics Analysis, Counts: 2007-1998

Affordability groups	<i>A</i> Total in 2007	<i>B</i> Non- Market in 1998	<i>C</i> Extremely Low Rent in 1998	<i>D</i> Very Low Rent in 1998	<i>E</i> Low Rent in 1998	<i>F</i> Moderate Rent in 1998	<i>G</i> High Rent in 1998	<i>H</i> Very High Rent in 1998	<i>I</i> Extremely High Rent in 1998	<i>J</i> Owner Occupied in 1998	<i>K</i> Seasonal or Vacant in 1998	<i>L</i> New Construc- tion	<i>M</i> Other Additions
Non-market	67,700	27,300	1,900	8,600	2,800	1,400	0	0	0	14,200	600	6,200	4,700
Extremely Low Rent	30,700	3,100	600	11,100	1,400	3,200	1,400	0	0	7,000	0	3,100	0
Very Low Rent	141,300	5,100	8,100	78,400	11,800	4,100	1,400	0	0	24,600	1,200	4,400	2,300
Low Rent	64,600	4,100	600	12,600	13,800	8,000	700	0	0	19,700	700	3,600	900
Moderate Rent	53,300	1,400	700	6,100	2,600	6,800	3,400	0	0	18,200	0	10,200	3,800
High Rent	24,000	0	700	3,900	700	700	700	0	0	10,400	0	6,700	300
Very High Rent	2,000	0	0	0	0	700	0	0	0	1,300	0	0	0
Extremely High Rent	7,900	0	0	0	0	700	0	0	0	2,500	0	3,700	1,000
Total	391,500	40,900	12,600	120,700	33,000	25,500	7,600	0	0	97,900	2,500	37,900	13,000

Table B shows there were 391,500 rental units in the Minneapolis-St. Paul metropolitan area in 2007, of which 151,300 were not rental units in 1998. The new units came from units that had been owner-occupied (97,900), units that had been vacant or in seasonal use (2,500), newly constructed units (37,900), and other additions (13,000). Most of the formerly owner-occupied units went to the very low rent, low rent, and moderate rent categories; most of the newly constructed rental units went to the moderate rent and very high rent categories, with a sizable share to non-market units.

There was an absolute increase in both the number of rental units and the number of affordable rental units between 1998 and 2007. The number of rental units grew by 25 percent. The number of units that were non-market, affordable to extremely low income persons, or affordable to very low income persons increased from 229,900 to 239,700, an increase of 4.3 percent. Fifty-nine percent of the extremely low rent units in 2007 came from two sources: very low rent units (36 percent) and formerly owner-occupied units (23 percent). The non-market, moderate rent, and new construction categories contributed 10 percent each. Seventy-three percent of the very low rent units in 2007 came from the same two sources: very low rent units (56 percent) and formerly owner-occupied units (17 percent).

Concluding Cautions

Readers should use caution in interpreting the results of the CINCH and rental dynamics analysis for Minneapolis-St. Paul over the period between 1998 and 2007. Small sample sizes reduce the reliability of estimates for a number of segments of the housing stocks, especially for the forward-looking analyses. In particular, counts of mobile homes are substantially in error.

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 (13-26) 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. As noted in the text, the backward-looking weights produced estimates closer to the published estimates.

Appendix B: Weighting

CINCH separates the AHS samples in 1998 and 2007 into three pieces: (1) units that exist and are part of the housing stock in both years (SAMES); (2) units that are part of the 1998 housing stock but are not part of the 2007 housing stock (LOSSES); and (3) units that are not part of the 1998 housing stock but are part of the 2007 housing stock (ADDITIONS). ADDITIONS are split into NEW CONSTRUCTION and RECOVERIES (structures that existed in 1998 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 1998 and those ADDITIONS that were interviewed in 2007.

For the forward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 1998 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted count in 1998 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 1998.

For the backward-looking analysis, we started with the AHS pure weights and used the AHS weighted count in 2007 of SAMES to create weights for the interviewed SAMES. We used the AHS weighted counts in 2007 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 2007.

The logic behind the weighting and the procedures used to create the weights are explained in *Weighting Strategy for 2007 Metropolitan CINCH and Rental Dynamics Analysis*.