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American Housing Survey

Components of Inventory Change and Rental Market Dynamics: Washington 1998-2007

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American Housing Survey

**Components of Inventory Change
and Rental Dynamics:
Washington 1998–2007**

Prepared for:
U.S. Department of Housing & Urban Development
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Table of Contents

Overview	1
Data Issues Affecting the Analyses.....	2
How to Read CINCH Tables.....	3
Columns Common to Both Forward-Looking and Backward-Looking Tables.....	3
Columns Unique to Forward-Looking Tables.....	4
Columns Unique to Backward-Looking Tables	5
Table 1.....	6
Table 2.....	7
Table 3.....	8
Table 4.....	8
Changes in the Washington Housing Stock: 1998–2007	19
Rental Market Dynamics.....	21
Concluding Cautions	24
Appendix A: Comparison between the Geography Used for the 1998 AHS Survey of Washington and the Geography Used for the 2007 AHS Survey	A-1
Appendix B: Internal and External Checks.....	B-1
Appendix C: Weighting.....	C-1

List of Tables

Forward-Looking Table 1: Structural and Location Characteristics – All Housing Units	9
Forward-Looking Table 2: Condition of Unit – All Occupied Units.....	11
Forward-Looking Table 3: Household Characteristics – All Occupied Units	12
Forward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units	13
Backward-Looking Table 1: Structural and Location Characteristics – All Housing Units	14
Backward-Looking Table 2: Condition of Unit – All Occupied Units.....	16
Backward-Looking Table 3: Household Characteristics – All Occupied Units.....	17
Backward-Looking Table 4: Market Dynamics and Affordability – All Occupied Units	18
Forward-Looking Table 5: Selected Loss Rates.....	19
Backward-Looking Table 5: Selected Addition Rates.....	21
Table A: Forward-Looking Rental Dynamics Analysis, Counts: 1998-2007	23
Table B: Backward-Looking Rental Dynamics Analysis, Counts: 2007-1998	23

Components of Inventory Change and Rental Market Dynamics: Washington 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 Washington 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 C 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 Washington 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 Washington housing stock between 1998 and 2007.
- A brief discussion of the rental market dynamics results, using CINCH-like tables.

There are three appendices:

- Appendix A compares the 1998 AHS geography for the Washington metropolitan area to the AHS geography in 2007.
- Appendix B explains how the results were tested.
- Appendix C 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 Washington contained 4,816 housing units; the 2007 sample contained only 2,781 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 the Washington metropolitan area by adding two counties in Virginia and one county in West Virginia. The additional

counties had a 2007 population of approximately 85,000. Appendix A compares the old geography used for the Washington metropolitan area (5,028.4 square miles and 4.0 million people) to the new geography (5,627.0 square miles and 4.8 million people).

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 Washington uses a sample of 1,734 units, of which only 6 are mobile homes; the backward-looking CINCH analysis uses a sample of 2,096, of which only 8 are mobile homes. The forward-looking analysis can track what happens only to 1998 housing units that are in the places common to both the old and new geographical boundaries. The backward-looking analysis explains where all additions to the 2007 housing stock in the new geography came from, but for 2007 units that existed in 1998, it can explain only where those units common to both geographies came from.

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 Washington 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 Washington counted 1,672,700 occupied units (row 2, column B, Forward-Looking Table 1); the 2007 AHS report counted 1,949,100 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 1,525,800 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 130,900 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 Washington metropolitan area, 2,900 units were lost to mergers or conversions between 1998 and 2007.

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.

- 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 Washington 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 business rather than residential purposes.⁴ Among occupied units, 1,800 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, 3,800 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 Washington metropolitan area, 6,000 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 5,000 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 Washington metropolitan area, 12,500 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. Of the housing units in the 2007 housing stock, 2,000 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, 1,800 had been nonresidential.

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

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 I is the CINCH estimate of the number of units from column C that were newly constructed between 1998 and 2007. Among occupied units, 249,600 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 no recovered units.
- Column K includes units added by the Census Bureau for other reasons. Of the entire housing stock in the Washington metropolitan area, 20,400 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

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.

guttled 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

Rows 39–44 focus on multi-unit structures only and divide them by number of stories. Column E is forced to be zero.

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.

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

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.

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 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	1,817,400	1,817,300	1,792,900	0	2,900	0	3,800	3,800	6,000	7,800	1
	Occupancy Status											
2	Occupied	1,672,700	1,672,600	1,525,800	130,900	1,900	0	1,900	1,000	6,000	5,000	2
3	Vacant	141,800	141,800	26,500	106,900	900	0	1,900	2,800	0	2,800	3
4	Seasonal	2,900	2,900	0	2,900	0	0	0	0	0	0	4
	Units in Structure											
5	1, detached	917,000	927,300	921,700	0	900	0	900	900	900	1,900	5
6	1, attached	398,900	397,800	391,900	0	0	0	1,000	1,900	1,000	1,900	6
7	2 to 4	69,600	46,200	43,200	0	1,000	0	0	0	1,000	1,000	7
8	5 to 9	56,600	62,700	59,700	0	0	0	900	1,000	0	1,000	8
9	10 to 19	169,400	174,300	172,200	0	0	0	0	0	1,000	1,000	9
10	20 to 49	35,200	34,100	32,200	0	0	0	900	0	0	1,000	10
11	50 or more	154,700	159,600	156,600	0	900	0	0	0	2,000	0	11
12	Mobile Home/Trailer	16,000	15,300	15,300	0	0	0	0	0	0	0	12
	Year Built											
15	1995-2000	102,400	106,000	106,000	0	0	0	0	0	0	0	15
16	1990-1994	145,400	152,900	152,900	0	0	0	0	0	0	0	16
17	1985-1989	217,700	225,600	224,600	0	0	0	0	0	0	1,000	17
18	1980-1985	119,900	120,900	120,900	0	0	0	0	0	0	0	18
19	1975-1979	157,600	158,300	156,300	0	0	0	0	0	2,000	0	19
20	1970-1974	148,200	151,000	149,000	0	0	0	0	0	0	2,000	20
21	1960-1969	333,100	333,100	329,300	0	0	0	900	0	1,900	900	21
22	1950-1959	225,300	244,600	236,700	0	0	0	2,900	1,000	1,000	3,000	22
23	1940-1949	173,700	148,900	147,000	0	900	0	0	900	0	0	23
24	1930-1939	77,200	67,900	64,000	0	1,000	0	0	900	1,000	900	24
25	1920-1929	38,500	34,400	34,400	0	0	0	0	0	0	0	25
26	1919 or earlier	78,500	73,800	71,900	0	900	0	0	900	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	493,800	495,800	398,000	85,200	1,900	0	2,900	1,900	4,000	1,900	27
28	5 rooms	263,200	280,500	112,800	162,900	0	0	900	0	0	4,000	28
29	6 rooms	256,300	228,100	93,000	132,100	0	0	0	900	1,000	1,000	29
30	7 rooms	246,900	259,200	116,700	139,600	900	0	0	900	0	1,000	30
31	8 rooms	244,900	230,600	86,200	144,500	0	0	0	0	0	0	31
32	9 rooms	146,100	151,900	36,900	114,000	0	0	0	0	900	0	32
33	10 rooms or more	166,200	171,200	80,700	90,400	0	0	0	0	0	0	33
	Bedrooms											
34	None	6,000	4,100	0	2,100	1,000	0	0	0	1,000	0	34
35	1	289,800	288,600	224,400	56,400	900	0	1,000	1,000	3,000	1,900	35
36	2	411,600	402,700	311,200	84,700	0	0	2,800	900	0	3,000	36
37	3	589,800	592,400	443,100	144,500	900	0	0	0	1,900	1,900	37
38	4 or more	520,200	529,500	428,100	98,500	0	0	0	1,900	0	1,000	38
39	Multiunit Structures Stories in Structures	485,500	476,900	464,000	0	1,900	0	1,900	1,000	4,000	4,000	39
40	1	NA	21,500	20,600	0	0	0	900	0	0	0	40
41	2	NA	50,000	47,000	0	0	0	900	0	0	2,000	41
42	3	NA	173,800	168,700	0	1,000	0	0	1,000	2,000	1,000	42
43	4 to 6	NA	108,000	107,000	0	0	0	0	0	0	1,000	43
44	7 or more	NA	123,700	120,700	0	900	0	0	0	2,000	0	44
	Metropolitan status											
45	In central cities	NA	297,500	283,800	0	900	0	2,900	1,900	5,000	3,000	45
46	In suburbs	NA	1,519,800	1,509,100	0	1,900	0	900	1,900	900	4,900	46
	Mover status											
47	Moved in last 2 years	NA	381,700	108,400	267,300	0	0	1,000	1,000	1,000	3,000	47
48	Not a Recent Mover	NA	1,290,900	1,026,500	254,500	1,900	0	900	0	5,000	2,000	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	1,672,700	1,672,600	1,525,800	130,900	1,900	0	1,900	1,000	6,000	5,000	1
	Kitchen											
2	Complete kitchen	1,639,100	1,637,200	1,483,600	138,600	900	0	1,900	1,000	6,000	5,000	2
3	Not complete kitchen	33,500	35,400	0	34,400	1,000	0	0	0	0	0	3
	Plumbing											
4	With all plumbing	1,662,500	1,656,900	1,497,400	144,500	900	0	1,900	1,000	6,000	5,000	4
5	Lack some plumbing	10,200	15,700	0	14,700	1,000	0	0	0	0	0	5
6	No hot piped water	400	0	0	0	0	0	0	0	0	0	6
7	No bathtub/shower	400	0	0	0	0	0	0	0	0	0	7
8	No flush toilet	1,300	0	0	0	0	0	0	0	0	0	8
9	No exclusive use	8,900	15,700	0	14,700	1,000	0	0	0	0	0	9
	Water											
10	Public/private water	1,558,400	1,545,800	1,409,200	121,600	1,900	0	1,900	1,000	5,000	5,000	10
11	Well	112,000	126,800	112,300	13,500	0	0	0	0	900	0	11
12	Other water source	2,200	0	0	0	0	0	0	0	0	0	12
	Sewer											
13	Public sewer	1,519,300	1,519,400	1,376,400	128,000	1,900	0	1,900	1,000	5,000	5,000	13
14	Septic tank/cesspool	152,100	153,200	128,200	24,100	0	0	0	0	900	0	14
15	Other or none	1,300	0	0	0	0	0	0	0	0	0	15
		0	0	0	0	0	0	0	0	0	0	
16	Severe Problems	24,200	33,200	1,000	29,100	1,000	0	0	0	2,000	0	16
17	Plumbing	10,200	15,700	0	14,700	1,000	0	0	0	0	0	17
18	Heating	12,700	16,300	1,000	13,300	0	0	0	0	2,000	0	18
19	Electric	0	0	0	0	0	0	0	0	0	0	19
20	Upkeep	1,700	2,100	0	2,100	0	0	0	0	0	0	20
	Moderate problems	68,400	67,600	0	65,600	0	0	0	0	0	2,000	21
22	Plumbing	5,700	3,200	0	3,200	0	0	0	0	0	0	22
23	Heating	900	0	0	0	0	0	0	0	0	0	23
24	Kitchen	31,900	35,400	0	34,400	1,000	0	0	0	0	0	24
25	Upkeep	29,900	33,200	0	30,200	0	0	0	0	1,000	2,000	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	1,672,700	1,672,600	1,525,800	130,900	1,900	0	1,900	1,000	6,000	5,000	1
	Age of Householder											
2	Under 65	1,435,800	1,426,800	1,197,900	216,900	1,900	0	1,000	1,000	3,000	5,000	2
3	65 or older	236,800	245,800	121,100	120,800	0	0	900	0	3,000	0	3
	Children											
4	Some	587,900	572,100	272,600	295,400	0	0	1,000	0	1,000	2,000	4
5	None	1,084,900	1,100,500	756,100	332,600	1,900	0	900	1,000	5,000	3,000	5
	Race/Origin of Householder											
6	White	1,109,700	1,124,100	883,200	236,000	1,900	0	0	0	900	2,000	6
7	Hispanic	66,400	62,600	33,700	28,900	0	0	0	0	0	0	7
8	NonHispanic	1,043,300	1,061,500	778,800	277,900	1,900	0	0	0	900	2,000	8
9	Black	415,800	409,900	275,100	124,800	0	0	1,900	1,000	4,000	3,000	9
10	Other	147,200	138,600	52,100	85,500	0	0	0	0	1,000	0	10
11	Total Hispanics	109,300	99,800	54,900	44,000	0	0	0	0	1,000	0	11
	Income Source											
12	Wages and salaries	1,455,400	1,339,300	1,083,000	246,300	1,900	0	0	1,000	4,000	3,000	12
13	Social security or pension	329,500	313,400	129,200	181,400	0	0	900	0	1,900	0	13
14	Welfare or SSI	42,300	35,900	2,200	32,600	0	0	0	0	0	1,000	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	1,672,700	1,672,600	1,525,800	130,900	1,900	0	1,900	1,000	6,000	5,000	1
	Tenure											
2	Owner occupied	1,078,200	1,078,200	954,400	120,900	900	0	900	0	900	0	2
3	Pct owner-occupied	64.5%	64.5%									3
4	Renter occupied	594,400	594,400	395,800	185,500	1,000	0	1,000	1,000	5,000	5,000	4
	Renter Monthly Housing Costs											
5	No cash rent	19,700	13,100	0	12,100	0	0	0	0	0	1,000	5
6	Less than \$350	51,300	49,200	17,600	28,600	1,000	0	1,000	0	1,000	0	6
7	\$350 to \$599	109,300	107,500	11,000	90,500	0	0	0	1,000	3,000	2,000	7
8	\$600 to \$799	173,900	179,900	2,200	175,700	0	0	0	0	0	2,000	8
9	\$800 to \$1249	182,500	184,400	31,800	151,500	0	0	0	0	1,000	0	9
10	\$1,250 or more	57,600	60,400	19,800	40,600	0	0	0	0	0	0	10
	Renter Hsd Income											
11	Less than \$15,000	110,000	99,500	23,100	71,400	0	0	1,000	0	3,000	1,000	11
12	\$15,000 to \$29,999	130,100	128,000	20,900	103,100	1,000	0	0	0	1,000	2,000	12
13	\$30,000 to \$49,999	157,900	159,000	23,100	132,900	0	0	0	0	1,000	2,000	13
14	\$50,000 to \$99,999	158,600	161,800	34,000	126,800	0	0	0	1,000	0	0	14
15	\$100,000 or more	37,900	46,100	6,600	39,500	0	0	0	0	0	0	15
	Owner Monthly Housing Costs											
16	Less than \$350	132,100	101,900	12,200	89,700	0	0	0	0	0	0	16
17	\$350 to \$599	160,900	173,300	24,900	148,400	0	0	0	0	0	0	17
18	\$600 to \$799	78,400	81,200	9,200	72,000	0	0	0	0	0	0	18
19	\$800 to \$1249	257,800	232,400	41,200	190,200	0	0	900	0	0	0	19
20	\$1,250 or more	449,000	489,400	378,800	108,700	900	0	0	0	900	0	20
	Owner Hsd Income											
21	Less than \$15,000	65,900	73,100	8,600	63,600	0	0	900	0	0	0	21
22	\$15,000 to \$29,999	82,100	82,100	12,300	69,800	0	0	0	0	0	0	22
23	\$30,000 to \$49,999	152,000	155,100	25,700	129,400	0	0	0	0	0	0	23
24	\$50,000 to \$99,999	416,300	401,200	126,200	274,100	0	0	0	0	900	0	24
25	\$100,000 or more	362,100	366,600	235,900	129,700	900	0	0	0	0	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	2,133,500	2,133,500	1,816,300	0	12,500	2,000	2,600	279,800	0	20,400	1
	Occupancy Status											
2	Occupied	1,949,100	1,949,200	1,559,900	112,300	10,100	2,000	1,800	249,600	0	13,400	2
3	Vacant	175,500	175,500	24,600	116,100	2,400	0	800	28,800	0	2,800	3
4	Seasonal	8,800	8,800	0	3,300	0	0	0	1,300	0	4,200	4
	Units in Structure											
5	1, detached	1,043,900	1,066,200	913,200	0	2,600	0	0	138,700	0	11,700	5
6	1, attached	426,100	415,800	340,600	0	1,700	0	0	71,800	0	1,700	6
7	2 to 4	54,900	48,500	40,500	0	5,400	0	0	1,600	0	900	7
8	5 to 9	96,100	92,400	90,800	0	0	0	0	1,600	0	0	8
9	10 to 19	216,200	220,800	200,500	0	900	0	2,600	16,000	0	800	9
10	20 to 49	45,400	42,400	29,100	0	900	0	0	12,400	0	0	10
11	50 or more	228,000	229,600	185,800	0	900	0	0	37,500	0	5,400	11
12	Mobile Home/Trailer	22,800	17,900	15,900	0	0	2,000	0	0	0	0	12
	Year Built											
13	2005-2007	59,800	52,500	0	0	0	0	0	52,500	0	0	13
14	2000-2005	166,100	148,500	0	0	0	2,000	0	146,600	0	0	14
15	1995-2000	146,900	152,900	108,700	0	800	0	0	41,700	0	1,700	15
16	1990-1994	166,500	170,400	154,600	0	0	0	0	11,000	0	4,700	16
17	1985-1989	230,300	239,600	229,400	0	0	0	0	7,600	0	2,600	17
18	1980-1985	122,700	123,900	119,600	0	0	0	0	4,300	0	0	18
19	1970-1979	309,800	322,400	311,100	0	1,800	0	0	6,800	0	2,600	19
21	1960-1969	335,000	336,000	331,700	0	0	0	900	2,500	0	900	21
22	1950-1959	237,400	251,200	243,100	0	3,700	0	0	2,500	0	1,800	22
23	1940-1949	148,200	150,100	146,000	0	2,600	0	0	0	0	1,400	23
24	1930-1939	79,000	70,700	66,400	0	900	0	900	2,600	0	0	24
25	1920-1929	42,400	38,200	33,900	0	1,800	0	800	0	0	1,700	25
26	1919 or earlier	89,300	77,200	71,800	0	800	0	0	1,600	0	3,000	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	569,800	561,000	397,900	91,000	9,900	0	2,600	54,500	0	5,100	27
28	5 rooms	295,400	288,200	115,500	138,700	1,800	1,000	0	29,500	0	1,600	28
29	6 rooms	316,100	323,800	94,000	189,100	0	900	0	34,100	0	5,700	29
30	7 rooms	317,100	314,900	118,500	160,900	800	0	0	33,900	0	900	30
31	8 rooms	253,500	259,500	88,200	132,700	0	0	0	35,400	0	3,200	31
32	9 rooms	175,500	183,100	37,700	109,000	0	0	0	35,600	0	900	32
33	10 rooms or more	206,100	202,900	83,000	60,200	0	0	0	56,700	0	3,000	33
	Bedrooms											
34	None	28,300	28,900	0	26,700	1,700	0	0	500	0	0	34
35	1	312,000	291,400	225,100	28,700	6,400	0	2,600	25,100	0	3,600	35
36	2	440,500	438,700	312,900	70,100	2,700	0	0	49,200	0	3,800	36
37	3	674,900	689,200	451,900	142,300	900	2,000	0	84,400	0	7,700	37
38	4 or more	677,800	685,300	436,600	122,100	800	0	0	120,500	0	5,300	38
39	Multiunit Structures	640,600	633,700	546,700	0	8,200	0	2,600	69,200	0	7,100	39
	Stories in Structures											
40	1	NA	33,100	31,800	0	900	0	0	400	0	0	40
41	2	NA	58,400	52,500	0	2,600	0	0	2,400	0	900	41
42	3	NA	238,700	202,900	0	2,800	0	1,700	27,200	0	4,100	42
43	4 to 6	NA	149,300	125,000	0	900	0	0	23,400	0	0	43
44	7 or more	NA	154,100	134,500	0	900	0	900	15,700	0	2,100	44
	Metropolitan status											
45	In central cities	NA	325,200	286,800	0	9,000	0	2,600	22,300	0	4,500	45
46	In suburbs	NA	1,808,300	1,529,500	0	3,600	2,000	0	257,500	0	15,900	46
	Mover status											
47	Moved in last 2 years	NA	408,400	110,800	216,200	7,400	1,000	900	71,200	0	900	47
48	Not a Recent Mover	NA	1,540,800	1,048,700	296,500	2,800	900	900	178,400	0	12,500	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	1,949,100	1,949,200	1,559,900	112,300	10,100	2,000	1,800	249,600	0	13,400	1
	Kitchen											
2	Complete kitchen	1,927,500	1,929,500	1,517,400	140,600	9,200	2,000	900	246,000	0	13,400	2
3	No complete kitchen	21,600	19,700	0	14,300	900	0	900	3,600	0	0	3
	Plumbing											
4	With all plumbing	1,933,800	1,932,500	1,531,100	125,000	10,100	2,000	1,800	249,100	0	13,400	4
5	Lack some plumbing	15,400	16,700	0	16,200	0	0	0	500	0	0	5
6	No hot piped water	0	0	0	0	0	0	0	0	0	0	6
7	No bathtub/shower	0	0	0	0	0	0	0	0	0	0	7
8	No flush toilet	0	0	0	0	0	0	0	0	0	0	8
9	No exclusive use	15,400	16,700	0	16,200	0	0	0	500	0	0	9
	Water											
10	Public/private water	,808,300	1,800,400	1,438,900	112,400	10,100	900	1,800	229,000	0	7,400	10
11	Well	139,300	148,800	116,800	4,200	0	1,000	0	20,700	0	6,100	11
12	Other water source	1,500	0	0	0	0	0	0	0	0	0	12
	Sewer											
13	Public sewer	,772,300	1,768,400	1,405,300	121,300	10,100	900	1,800	222,500	0	6,500	13
14	Septic tank/cesspool	176,800	180,800	132,900	12,700	0	1,000	0	27,200	0	6,900	14
	Severe Problems											
16	Severe Problems	27,100	29,600	1,100	28,000	0	0	0	500	0	0	16
17	Plumbing	15,400	16,700	0	16,200	0	0	0	500	0	0	17
18	Heating	11,700	12,900	1,100	11,800	0	0	0	0	0	0	18
20	Upkeep	0	0	0	0	0	0	0	0	0	0	20
	Moderate problems											
21	Moderate problems	46,800	42,300	0	36,900	900	0	900	3,600	0	0	21
22	Plumbing	2,900	3,200	0	3,200	0	0	0	0	0	0	22
23	Heating	1,100	0	0	0	0	0	0	0	0	0	23
24	Kitchen	21,600	19,700	0	14,300	900	0	900	3,600	0	0	24
25	Upkeep	23,200	25,900	0	25,900	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	1,949,100	1,949,200	1,559,900	112,300	10,100	2,000	1,800	249,600	0	13,400	1
	Age											
2	Under 65	1,666,500	1,668,500	1,224,100	206,500	9,200	2,000	1,800	217,000	0	7,900	2
3	65 or older	282,700	280,700	124,000	117,600	900	0	0	32,700	0	5,500	3
	Children											
4	Some	667,300	681,600	278,300	282,800	1,800	0	0	116,900	0	1,800	4
5	None	1,281,800	1,267,600	772,400	338,800	8,300	2,000	1,800	132,700	0	11,600	5
	Race/Origin											
6	White	1,266,100	1,277,000	904,200	186,200	6,500	1,000	900	168,600	0	9,700	6
7	Hispanic	158,700	157,800	34,300	111,600	900	0	0	10,400	0	500	7
8	NonHispanic	1,107,400	1,119,200	797,700	146,800	5,500	1,000	900	158,100	0	9,200	8
9	Black	500,900	486,200	281,000	144,900	3,700	0	900	53,400	0	2,300	9
10	Other	182,200	186,000	53,300	102,700	0	900	0	27,700	0	1,400	10
11	Total Hispanics	185,200	182,100	55,900	112,500	1,900	0	0	11,300	0	500	11
	Income Source											
12	Wages and salaries	1,619,600	1,618,200	668,600	723,000	8,300	2,000	1,800	208,800	0	5,700	12
13	Social security or pension	303,200	302,500	132,300	129,000	900	900	0	32,100	0	7,200	13
14	Welfare or SSI	22,000	20,100	2,200	15,300	0	0	0	2,600	0	0	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	1,949,100	1,949,200	1,559,900	112,300	10,100	2,000	1,800	249,600	0	13,400	1
	Tenure											
2	Owner occupied	1,329,600	1,329,600	980,700	153,500	900	900	900	184,100	0	8,600	2
3	Percent owner-occupied	68.2%	68.2%									3
4	Renter occupied	619,600	619,600	401,800	136,200	9,300	1,000	900	65,600	0	4,800	4
	Renter Monthly Housing Costs											
5	No cash rent	19,300	12,500	0	8,900	0	0	0	2,700	0	900	5
6	Less than \$350	40,700	42,400	17,800	21,200	900	0	0	1,400	0	1,000	6
7	\$350 to \$599	49,000	47,900	11,200	33,500	1,800	0	0	1,500	0	0	7
8	\$600 to \$799	55,900	50,200	2,200	36,100	1,900	0	0	8,600	0	1,400	8
9	\$800 to \$1,249	231,500	237,500	32,300	183,300	1,900	1,000	900	16,700	0	1,400	9
10	\$1,250 or more	223,200	229,000	20,100	171,400	2,800	0	0	34,800	0	0	10
	Renter Hsd Income											
11	Less than \$15,000	108,200	97,800	23,400	60,200	900	0	900	9,900	0	2,500	11
12	\$15,000 to \$29,999	96,100	96,100	21,200	62,900	0	0	0	11,500	0	500	12
13	\$30,000 to \$49,999	124,100	128,200	23,400	88,500	0	0	0	15,300	0	900	13
14	\$50,000 to \$99,999	199,100	200,400	34,600	141,600	8,300	1,000	0	14,000	0	900	14
15	\$100,000 or more	91,900	97,200	6,700	75,600	0	0	0	14,900	0	0	15
	Owner Monthly Housing Costs											
16	Less than \$350	68,400	52,700	12,600	32,500	900	900	0	3,300	0	2,600	16
17	\$350 to \$599	111,100	100,900	25,600	68,600	0	0	0	5,900	0	900	17
18	\$600 to \$799	101,300	98,400	9,500	83,800	0	0	0	4,200	0	900	18
19	\$800 to \$1,249	178,400	175,400	42,400	118,700	0	0	0	13,500	0	900	19
20	\$1,250 or more	870,300	902,200	387,400	353,300	0	0	900	157,200	0	3,400	20
	Owner Hsd Income											
21	Less than \$15,000	43,200	46,000	8,900	33,700	0	0	0	3,400	0	0	21
22	\$15,000 to \$29,999	98,700	95,700	12,600	76,200	0	900	0	4,200	0	1,700	22
23	\$30,000 to \$49,999	147,500	146,700	26,400	107,100	900	0	0	9,900	0	2,600	23
24	\$50,000 to \$99,999	379,600	375,900	129,600	207,200	0	0	900	36,500	0	1,700	24
25	\$100,000 or more	660,600	665,200	240,700	291,900	0	0	0	130,100	0	2,600	25

Changes in the Washington Housing Stock: 1998–2007

Forward-Looking Table 5 looks at how losses affected certain portions of the Washington 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	1.3%	0.2%	1.1%
Vacant units	5.9%	2.0%	4.0%
Units in structures with 2-4 units	6.5%	0.0%	6.5%
Units in structures with 5-9 units	4.7%	1.6%	3.1%
Units built 1930-1939	5.7%	1.4%	4.3%
Units built 1920-1929	0.0%	0.0%	0.0%
Units built in 1919 or earlier	2.5%	1.3%	1.3%
Units with 1-4 rooms	2.6%	0.4%	2.2%
Units with no bedrooms	48.7%	0.0%	48.7%
Units in central cities	4.6%	0.6%	4.0%
Units outside of central city	0.7%	0.1%	0.6%
Occupied units¹⁶	1.0%	0.1%	0.9%
Units with severe problems	9.1%	0.0%	9.1%
Units with moderate problems	3.0%	0.0%	3.0%
Units with a white householder	0.4%	0.0%	0.4%
Units with a Black householder	2.4%	0.2%	2.2%
Units with Hispanic householder	1.0%	0.0%	1.0%
Household receives welfare/SSI	0.7%	0.1%	0.7%
Owner-occupied units	0.3%	0.0%	0.3%
Renter-occupied units	2.2%	0.2%	2.0%
Renter-occupied – monthly housing costs less than \$350	6.1%	0.0%	6.1%
Renter-occupied – household income less than \$15,000	5.1%	0.0%	5.1%

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, 1.3 percent of the units in the 1998 housing stock were no longer part of the housing stock; 0.2 percent were permanent losses, that is, the units had either been demolished or destroyed by fire or natural disasters, while 1.1 percent were lost in ways that could be reversed, such as nonresidential use.

Units that were vacant in 1998 had a much higher loss rate, as did units in structures containing 2 to 4 units, units in buildings containing 5 to 9 units, and units built between 1930 and 1939. The central city loss rate was 4.6 percent compared to 0.7 percent for the rest of the metropolitan area. The extremely high loss rate for units with no bedrooms is unreliable because of the very small sample.

Among units occupied in 1998, 1.0 percent were lost by 2007. The loss rate was higher for units with moderate physical problems, and very high for the units with severe physical problems. Units with Black householders had a loss rate of 2.4 percent.

The loss rate among rental units was more than six 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 vacant units and units in buildings with 5 to 9 units. Potentially reversible losses were high among units in buildings with 2 to 4 units and low rent units.

Backward-Looking Table 5 presents addition rates for selected segments of the Washington 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 Washington housing stock in 2007, 14.9 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 1.8 percent of the total units in 2007.

Vacant units had higher than average rates of overall additions. Single units in attached structures had a higher than average addition rate, as well as units in structures containing 50 or more units and units with 10 or more rooms. The addition rate in central cities was 3.6 percentage points lower than the addition rate in the rest of the metropolitan area. New construction was much stronger outside of the central cities than in the central cities, while other additions were higher in 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	14.9%	13.1%	1.8%
Vacant units	19.8%	16.4%	3.4%
Single-unit, attached structure 18.1%		17.3%	0.8%
Units in structures with 50 or more units	19.1%	16.3%	2.7%
Units with 10 or more rooms	29.4%	28.0%	1.5%
Units with no bedrooms	7.7%	1.7%	5.9%
Units in central cities	11.8%	6.9%	4.9%
Units outside of central city	15.4%	14.2%	1.2%
Occupied units ¹⁸	14.2%	12.8%	1.4%
Owner-occupied units	14.7%	13.8%	0.8%
Renter-occupied units	13.2%	10.6%	2.6%
Renter-occupied - no cash rent	28.6%	21.4%	7.3%
Renter-occupied - monthly housing costs less than \$350	7.9%	3.3%	4.6%
Renter-occupied - monthly housing costs \$1,250 or more	16.4%	15.2%	1.2%
Owner-occupied - monthly housing costs \$1,250 or more	17.9%	17.4%	0.5%
Owner-occupied - household income \$100,000 or more	19.9%	19.6%	0.4%

The rate of new additions was only slightly higher for owner-occupied units than for renter-occupied units. Addition rates were high at both ends of the rental stock: the no-cash rent group and the units renting for \$1,250 or more group. 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)

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.

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

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 654,000 rental units in the Washington metropolitan area in 1998. In 2007, 159,400 of these units were no longer rental; 125,700 were owner-occupied; 14,000 were either vacant or being used seasonally; and 19,700 had been lost to the stock. Taken as a proportion of the units in 1998, movement into owner-occupancy was high among units in the high rent and moderate rent categories, as well as the extremely low rent and low rent categories. Losses to the stock were high among extremely low rent units.

¹⁹ Because of top-coding of housing costs, there were no extremely high rents in 1998.

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	77,100	38,400	4,400	11,000	3,100	0	2,200	1,100	0	9,900	1,100	5,900
Extremely Low Rent	56,700	7,600	11,900	7,600	3,300	1,100	1,100	0	0	15,200	0	8,900
Very Low Rent	337,900	16,300	21,900	137,700	63,500	13,100	24,000	0	0	49,100	7,400	4,900
Low Rent	100,400	5,500	4,300	11,700	16,400	6,600	29,700	0	0	25,100	1,100	0
Moderate Rent	17,600	1,100	1,100	0	2,200	1,100	4,400	0	0	5,500	2,200	0
High Rent	63,300	1,100	1,100	1,100	3,200	1,100	28,300	3,300	1,100	20,900	2,200	0
Very High Rent	1,100	0	1,100	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	654,000	69,900	45,800	169,100	91,700	23,000	89,600	4,400	1,100	125,700	14,000	19,700

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	96,800	39,000	7,800	16,700	5,400	1,100	1,100	0	0	10,800	0	12,400	2,500
Extremely Low Rent	78,000	4,500	12,100	21,800	4,500	1,100	1,100	1,100	0	17,800	3,300	6,900	3,800
Very Low Rent	224,300	10,700	7,300	140,300	11,900	0	900	0	0	17,900	4,100	23,600	7,400
Low Rent	113,100	3,200	2,800	63,000	16,200	2,200	3,200	0	0	14,500	1,100	4,300	2,500
Moderate Rent	36,200	0	1,100	13,200	6,500	1,100	1,100	0	0	6,500	0	5,600	900
High Rent	140,700	2,100	900	24,000	29,400	4,500	29,800	0	0	26,800	4,000	16,300	2,800
Very High Rent	13,100	1,100	0	900	0	0	3,200	0	0	900	0	7,000	0
Extremely High Rent	7,500	0	0	0	0	0	1,100	0	0	2,200	900	3,200	0
Total	709,800	60,500	32,100	280,000	74,000	10,000	41,600	1,100	0	97,600	13,600	79,400	19,900

Table B shows there were 709,800 rental units in the Washington metropolitan area in 2007, of which 210,500 were not rental units in 1998. The new units came from units that had been owner-occupied (97,600), units that had been vacant or in seasonal use (13,600), newly constructed units (79,400), and other additions (19,900). Most of the formerly owner-occupied units went to the high rent, very low rent, and extremely low rent categories; most of the newly constructed rental units went to very low rent, high rent, and non-market categories.

The change in geographical boundaries between the 1998 and 2007 AHS surveys adds only a minor complication to the analysis of changes in rental patterns. The three counties that were added in 2007 are too small to greatly affect the following conclusion. Between 1998 and 2007, the number of rental units increased while the number of affordable rental units decreased. The number of rental units grew by 8.5 percent while the number of non-market, extremely low rent, and very low rent units declined by 15.4 percent from 471,700 in 1998 to 399,100 in 2007. The extremely low rent units in 2007 came from three main sources that accounted for 66 percent of the 2007 stock. In order of importance, they were very low rent units in 1998 (28 percent), units that were owner-occupied in 1998 (23 percent), and extremely low rent units (16 percent). Very low rent units were very stable over the period—63 percent of the very low rent units in 2007 were also very low rent units in 1998. Another 10 percent of the very low rent units came from new construction.

Concluding Cautions

The change in geographical boundaries had little effect on the CINCH and rental dynamics analysis for Washington because of the minor magnitude of the change. Small sample sizes did reduce the reliability of estimates for a number of segments of the housing stocks, particularly for mobile homes in the backward-looking analysis.

Appendix A: Comparison between the Geography Used for the 1998 AHS Survey of Washington and the Geography Used for the 2007 AHS Survey

1998 Geography:

District of Columbia
Alexandria city, VA
Arlington County, VA
Fairfax city, VA
Fairfax County, VA 3
Falls Church city, VA
Fauquier County, VA
Fredericksburg city, VA
Loudoun County, VA
Manassas city, VA
Manassas Park city, VA
Prince William County, VA
Spotsylvania County, VA
Stafford County, VA
Calvert County, MD
Charles County, MD
Frederick County, MD
Montgomery County, MD
Prince George's County, MD

(OMB includes Clarke, Culpepper, King George and Warren Counties, VA; and Berkley and Jefferson Counties, WV)

2007 Geography:

District of Columbia
Calvert County, MD
Charles County, MD
Frederick County, MD
Montgomery County, MD
Prince George's County, MD
Alexandria city, VA
Arlington County, VA
Clarke County, VA
Fairfax city, VA
Fairfax County, VA
Falls Church city, VA
Fauquier County, VA
Fredericksburg city, VA

Loudoun County, VA
Manassas city, VA
Manassas Park city, VA
Prince William County, VA
Spotsylvania County, VA
Stafford County, VA
Warren County, VA
Jefferson County, WV

(OMB same as AHS)

Appendix B: 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 C: 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*.