

American Housing Survey

**Components of Inventory Change and
Rental Dynamics Analysis:
Providence, 1998–2011**

Prepared For:

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

Prepared By:

**Frederick J. Eggers & Fouad Moumen
Econometrica, Inc.
Bethesda, MD**

**Contract No. C-CHI-01030
Order No. CHI-T0002
Project No. 1053-002**

May 2015

Table of Contents

Executive Summary	iv
1. Introduction	1
2. Special Issues: Providence.....	2
3. Changes to the Housing Stock: 1998–2011	4
4. Components With Atypical Losses or Additions	6
5. Rental Market Dynamics: 1998–2011	9
6. Summary of Housing Market Changes: Providence Metropolitan Area, 1998–2011	11
Appendix A: CINCH and Rental Dynamics Methodology	A-1
Appendix B: CINCH and Rental Dynamics Tables	B-1

List of Tables

Table 1: Disposition of 1998 Providence Housing Units in 2011	4
Table 2: Sources for 2011 Providence Housing Stock	5
Table 3: Sectors Experiencing Atypical Loss Rates in Providence, 1998–2011	6
Table 4: Sectors Experiencing Atypical Rates of Addition in Providence, 1998–2011	7
Table 5: Summary of Forward-Looking Rental Dynamics for Providence.....	10
Table 6: Summary of Backward-Looking Rental Dynamics for Providence	11
Forward-Looking Table A: Housing Characteristics, Providence.....	B-6
Forward-Looking Table B: Unit Quality, Providence	B-9
Forward-Looking Table C: Occupant Characteristics, Providence	B-11
Forward-Looking Table D: Income and Housing Cost, Providence	B-13
Backward-Looking Table A: Housing Characteristics, Providence	B-15
Backward-Looking Table B: Unit Quality, Providence	B-18
Backward-Looking Table C: Occupant Characteristics, Providence	B-20
Backward-Looking Table D: Income and Housing Cost, Providence.....	B-22
Forward-Looking Rental Dynamics Table 1: Counts, 1998–2011, Providence (All Numbers in Thousands).....	B-24
Forward-Looking Rental Dynamics Table 2: Row Percentages, 1998–2011, Providence.....	B-24
Backward-Looking Rental Dynamics Table 1: Counts, 1998–2011, Providence (All Numbers in Thousands).....	B-25
Backward-Looking Rental Dynamics Table 2: Row Percentages, 1998–2011, Providence	B-25

List of Figures

Figure A-1: How the Housing Inventory Changes	A-1
---	-----

Executive Summary

Components of Inventory Change (CINCH) is a tool used by housing analysts to study how the housing inventory changes over time. One typically thinks of the housing stock as evolving through two mechanisms—the construction of new units and the demolition of old units. While new construction and losses through demolition and natural disasters are the primary means by which the housing stock changes, CINCH shows that there are other important engines of change.

This report describes how the housing stock in the Providence metropolitan area changed between 1998 and 2011, with particular emphasis on affordable rental housing. The study uses data from the American Housing Survey, which collected detailed information on housing units in Providence and on their occupants in both 1998 and 2011.

In 1998 the Providence metropolitan area contained 415,400 housing units, including vacant units. By 2011 the number of housing units had increased to 583,000. This represents an overall increase of 40.3 percent, which translates to an average annual increase of 2.6 percent over the 13-year period. Part of this increase resulted from a redefinition of the metropolitan area, but we do not know how substantially the redefinition affected the observed growth.

Between 1998 and 2011, only 3,900 units left the housing stock. Of these, 1,400 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 700 are temporary losses—the original unit needs repairs or is being used for other purposes. These units may or may not return to the housing stock. Finally, there were 1,700 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations.

In the period between the 1998 and 2011 AHS surveys, 80,200 units were added to the housing stock. Ninety-one percent of these additions were newly constructed units. The 2011 AHS did not track move-ins of mobile homes in Providence. Also, 2,700 new units were formed from the conversion or merger of 1998 units. We classified 3,000 units as recovered because these units had been in the housing stock at some point but were classified in 1998 as nonresidential (2,300) or uninhabitable (700). Finally, 1,800 units were added in other unclassified ways.

The Providence metropolitan area lost 0.9 percent of all 1998 housing units by 2011; additions between 1998 and 2011 represent 13.8 percent of the 2011 housing stock. Additions varied across portions of the Providence housing market defined by the characteristics of the unit or its occupants. We observed the following patterns, which were both atypical of the overall housing stock and statistically significant:

- Single-family detached units had a higher-than-average rate of addition; single-family attached units had a very high rate of addition.
- Multifamily units had a lower-than-average rate of addition, and similar lower rates were common among many segments of the multifamily market as defined either by the number of units in a building or the number of floors.

- Unit size mattered. Small units (3 or 4 rooms or 1 or 2 bedrooms) had low rates of addition; large units (7 or more rooms or 4 or more bedrooms) had high rates.
- Units with householders 75 or older in 2011 had a low rate of addition, as did units with Black householders. Units occupied in 2011 by households with children had an above-average rate of addition, while those without children had a below-average rate.
- The rate of addition was low among units that were renter-occupied in 2011 and, among rental units, particularly low for those occupied by households earning less than \$50,000 and those with low monthly housing costs (generally less than \$1,250). Additions were high among high-cost rentals (\$1,250 or more) and among units with households earning \$100,000 or more.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units. Among owner-occupied units, those occupied by lower income owners and those with lower monthly housing costs (less than \$800) had low rates of addition, while those occupied by high-income owners (\$100,000 or more) and those with high monthly housing costs (\$1,250 or more) had high rates of addition.

The 1998 rental stock in Providence was affordable. Of the 155,200 rental units in 1998, 60,600 were extremely low rent or very low rent units. In addition, 39,000 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 64.2 percent of the 1998 rental stock. The three highest rent categories comprised 5.9 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—27.7 percent of all 1998 units compared to 15.9 percent. By 2011, 20.3 percent of the 155,200 rental units in 1998 were no longer in the rental stock. The largest proportion of these losses was due to changes in tenure.

The rental stock in Providence was less affordable in 2011 than in 1998. Of the 228,500 rental units in 2011, 54,100 were extremely low rent or very low rent units. In addition, 62,500 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 51.0 percent of the 2011 rental stock. The three highest rent categories comprised 9.9 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—25.4 percent of all 2011 units compared to 24.3 percent. Of the 228,500 rental units in 2011, 25.2 percent were not rental in 1998. The largest proportion of these gains was due to changes in tenure.

Components of Inventory Change and Rental Dynamics Analysis: Providence, 1998–2011

1. Introduction

This report describes how the housing stock in the Providence metropolitan area changed between 1998 and 2011, with particular emphasis on affordable rental housing. The study uses data from the American Housing Survey (AHS), which collected detailed information on housing units in Providence and on their occupants in both 1998 and 2011.¹

As part of its Components of Inventory Change (CINCH) program, the U.S. Department of Housing and Urban Development (HUD) has funded, for a number of years, similar studies of metropolitan areas to document changes in the American housing stock. These studies have traditionally included an assessment of changes in the rental housing market called rental dynamics. This paper is one of 29 metropolitan CINCH studies based on the information provided by the 2011 AHS.²

CINCH reports present both forward-looking analysis (what happened to the 1998 units by 2011) and backward-looking analysis (where the 2011 units came from in terms of 1998).³ This paper repeats the analysis contained in the most recent CINCH and rental dynamics studies, but its organization differs from that of previous reports.

- Section 2 discusses data and related issues that affect the CINCH and rental dynamics analysis for Providence.
- Section 3 explains the changes in the housing stock between 1998 and 2011 in terms of losses to the housing stock through demolitions or the other ways units can leave the housing stock and additions through new construction and other means.
- Section 4 looks at components of the housing stock that experienced losses or additions markedly different from the overall patterns of losses and additions.

¹ Since 1973, the U.S. Department of Housing and Urban Development (HUD) and the Census Bureau have conducted an extensive survey of the American housing stock called the American Housing Survey (AHS). The AHS has two components: a national survey that, since 1985, has collected data every 2 years on the entire U.S. housing stock and a metropolitan component that, since 1985, has collected data at various times on the housing stock of 45 metropolitan areas. Both the national and metropolitan components use the same sample of housing units in successive surveys, making it possible to observe changes in units over time. The initial samples have been augmented in later years to account for units added by new construction or other means.

² HUD also funds CINCH studies of survey-to-survey changes in the national stock. At the national level, the Rental Dynamics studies are published separately. For a complete list of all CINCH studies, see <http://www.huduser.org/portal/datasets/cinch.html>.

³ The forward-looking analysis was previously presented to HUD in December 2013. The data needed to produce the backward-looking analysis did not become available until after the allowed period of performance of the contract under which the previous report was completed.

- Section 5 breaks the rental housing stock into eight affordability categories and tracks what happened to units in each of those categories between 1998 and 2011.
- Section 6 summarizes the changes to the housing stock of the Providence metropolitan area between 1998 and 2011.

The paper concludes with two appendices that contain analyses and data found in the body of previous CINCH reports.

- Appendix A explains the CINCH and rental dynamics methodologies.
- Appendix B contains the detailed CINCH and rental dynamics tables found in previous reports.

National economic conditions shaped in important ways the changes observed in this report. The 1998–2011 period began toward the end of the longest recorded business cycle (March 1991 to November 2001), encompassed a vigorous expansion (November 2001 to December 2007), included the recent harsh recession (December 2007 to June 2009), and ended with a period of lackluster recovery.

2. Special Issues: Providence

Metropolitan areas are composed of counties or townships that are interrelated economically. The Office of Management and Budget periodically adjusts the composition of metropolitan areas as the economic relationships among counties change. In some cases, the AHS retains the metropolitan boundaries in effect when the original metropolitan sample was drawn; in other cases, the AHS will adjust the original sample to correspond to the new definition of the metropolitan area. A change in sample boundaries will affect the interpretation of CINCH analysis and its precision. The absolute sample size available to study changes between surveys determines how reliably the observed changes are measured.

Geography

In 1998 the Providence metropolitan area contained 415,400 housing units, including vacant units. By 2011 the number of housing units had increased to 583,000. This represents an overall increase of 40.3 percent, which translates to an average annual increase of 2.6 percent over the 13-year period. Part of this increase resulted from a redefinition of the metropolitan area, but we do not know how substantially the redefinition affected the observed growth.⁴

⁴ The Providence metropolitan area is defined by townships rather than counties which makes comparison of metropolitan definitions at different times difficult. Unlike other metropolitan areas studied in this series of reports, there is a substantial difference between the housing units count reported for 1998 (415,400) in the forward-looking analysis and the count of 2011 units present in 1998 (502,800) reported in the backward-looking analysis. This discrepancy implies a substantial boundary expansion of the metropolitan area between surveys.

A change in the geographical definition of Providence would affect the interpretation of the information presented in this report. Our analysis applies only to that portion of the metropolitan area that was common to the Providence metropolitan area as defined in both 1998 and 2011, but the application to the common area is not precise, as explained in Appendix A.

Sample size

Both CINCH and rental dynamics require that, if a sample unit is in both the 1998 and 2011 housing stock, it must be interviewed in both surveys to be included in the analysis. Other analytical requirements also limit effective sample size. There are 1,887 sample units that were common to the 1998 and 2011 AHS Providence surveys and satisfied all the analytical requirements.⁵ Between 1998 and 2011, 36 sample units in the common area meeting the analytical requirements were lost to the stock; thus, the forward-looking analysis is based on a maximum of 1,923 sample units. Between 1998 and 2011, 263 sample units meeting the analytical requirements were added to the AHS to represent additions to the stock throughout the metropolitan area as defined in 2011; thus, the backward-looking analysis is based on a maximum of 2,150 sample units. In the forward-looking analysis, the average weight of a sample unit is approximately 216 units; in the backward-looking analysis, the average weight of a sample unit is approximately 271 units.

Data reliability

All CINCH analysis relies on two AHS variables: NOINT (why there was no interview), which, among other things, explains why a unit is temporarily or permanently out of the stock, and REUAD (why unit added), which explains why a sample unit entered the sample. Both variables require some detective work on the part of Census Bureau staff, and the longer the period between surveys, the more difficult the detective work. At the national level, the AHS data are collected every 2 years, so it is relatively easy to determine why a unit has been removed from or added to the sample. In the case of Providence, 13 years separate the 2011 sample from the 1998 sample. As a result, explaining the loss or addition of sample units is very challenging. This report is part of a series that compares the housing stock in 2011 to the housing stock of 7 metropolitan areas in 1998, 12 metropolitan areas in 2002, 8 metropolitan areas in 2004, and 2 metropolitan areas in 2009. We compared the pattern of changes across the 29 areas studied in these reports to the changes recorded between 2009 and 2011 at the national level. With respect to losses, the patterns are reasonably similar except for the role played by the movement of mobile homes. Mobile home move-outs are much more important in explaining losses at the national level. At both the national and metropolitan levels, the “other” category accounts for one-fifth to one-quarter of the losses. With respect to additions, new construction accounts for 72 percent of all additions at the national level but 94 percent at the metropolitan level. We suspect that data issues downplay the importance of “means other than new construction” at the metropolitan level.

⁵ The 1998 AHS surveyed 4,724 units in the Providence metropolitan area; 2,437 of these units were in the 2011 AHS public use file (PUF). Of the 2,287 sample units no longer in the survey, 108 were legitimate temporary or permanent losses to the housing stock and were considered for the analysis. The remaining 2,179 cases are coded as “sample reduction for the current survey year” with no further explanation.

3. Changes to the Housing Stock: 1998–2011

Losses between 1998 and 2011

One typically thinks of the housing stock evolving through two mechanisms: the construction of new units and the demolition of old units. While new construction and losses through demolition and natural disasters are the primary means by which the housing stock changes, CINCH shows that there are other important engines of change.

Table 1 reports that between 1998 and 2011, only 3,900 units left the housing stock. Of these, 1,400 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 700 are temporary losses—the original unit needs repairs or is being used for other purposes. These units may or may not return to the housing stock. Finally, there were 1,700 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations.

Table 1: Disposition of 1998 Providence Housing Units in 2011⁶

Present in 1998	415,400
1998 units present in 2011	411,500
Units no longer in the stock	3,900
1998 units lost due to conversion/merger	500
1998 house or mobile home moved out	0
1998 units lost through demolition or disaster	900
Permanent losses	1,400
1998 units changed to nonresidential use	400
1998 units badly damaged or condemned	300
Temporary losses	700
1998 units lost in other ways	1,700

Demolitions and natural disasters accounted for 900 of the permanent losses, while mergers and conversions contributed another 500 permanent losses. “Conversion” is the terminology used in the AHS for the splitting of a unit into two or more units. The movement of a mobile home or house is considered a permanent loss because a housing unit is the combination of land and capital. While movement preserves the capital, it dissolves the union of capital and land that formed the original unit; therefore, the movement of a mobile home is considered a permanent loss. Unfortunately, the 2011 AHS survey in Providence did not track mobile home move-outs, probably because the long time between surveys makes it difficult to determine whether the current mobile home was the same mobile home as in 1998.

Sometimes houses are used for business purposes. Such commercial use or the use of a house for a group home is considered a change to a nonresidential use. Badly damaged units may be repaired, left in an unusable state, or demolished.

⁶ Numbers may not add consistently due to rounding. Counts were rounded to the nearest hundred.

Appendix B contains four forward-looking tables that break the overall stock into more than 100 subgroups, such as single-family detached houses or units occupied by Black householders in 1998. For each subgroup, these tables detail how many of the 1998 units in that subgroup are in the same subgroup in 2011, have moved into another subgroup, or have left the stock and how they left the stock. Section 4 looks across the Appendix B forward-looking tables and focuses on those subgroups that lost an unusually high or an unusually low number of units over the 1998–2011 period.

Additions between 1998 and 2011

Table 2, together with the backward-looking Appendix B tables, provides a great deal of information on additions to the housing stock between 1998 and 2011.⁷

Table 2: Sources for 2011 Providence Housing Stock⁸

2011 housing stock	583,000
2011 units present in 1998	502,800
Total additions to stock	80,200
Units added by new construction	72,800
House or mobile home moved in	0
Units added by conversion/merger	2,700
New or reconstructed units	75,500
Units added from nonresidential use	2,300
Units added from temporary losses	700
Recovered units	3,000
Units added in other ways	1,800

In the period between the 1998 and the 2011 AHS surveys, 80,200 units were added to the housing stock. Ninety-one percent of these additions were newly constructed units. The 2011 AHS did not track move-ins of mobile homes in Providence. Also, 2,700 new units were formed from the conversion or merger of 1998 units.

We classified 3,000 units as recovered because these units had been in the housing stock at some point but were classified in 1998 as nonresidential (2,300) or uninhabitable (700). Finally, 1,800 units were added in other unclassified ways.

Appendix B contains four backward-looking tables that break the overall stock into more than 100 subgroups. For each subgroup, these tables detail how many of the 2011 units in that subgroup were in the same subgroup in 1998, have moved from another subgroup, or are new additions to the stock. Section 4 looks across the Appendix B backward-looking tables and focuses on those subgroups that gained an unusually high or an unusually low number of units over the 1998–2011 period.

⁷ With the caveats noted in Appendix A, this analysis applies to the area common to both the 1998 and 2011 definitions of the metropolitan area. Inconsistencies between Tables 1 and 2 result from a combination of (1) changes in metropolitan boundaries, (2) changes in control housing counts between censuses, and (3) different weights.

⁸ Numbers may not add consistently due to rounding. Counts were rounded to the nearest hundred.

4. Components With Atypical Losses or Additions

The Providence metropolitan area lost 0.9 percent of all 1998 housing units by 2011, but the loss rate varied across sectors of the stock. For example, the occupied housing stock lost 0.8 percent of its units between 1998 and 2011.

We examined all of the components of the 1998 Providence housing stock contained in the four forward-looking tables in Appendix B to identify subgroups with unusual loss rates. Forward-Looking Table A reports information on all units in the stock; Table 3 lists subgroups from Table A with loss rates statistically different than the loss rate of the overall stock. Forward-Looking Tables B, C, and D describe important characteristics of occupied units and their residents; Table 3 lists subgroups from those tables with loss rates statistically different than the loss rate of occupied units. We also employed judgment in selecting among components with statistically different loss rates. In general, we looked for subgroups with loss rates less than half or more than double the benchmark rate, but we listed other subgroups if their inclusion illustrated interesting patterns within loss rates. Finally, Table 3 includes the loss rates for four key segments of the housing market—occupied units, vacant units, owner-occupied units, and renter-occupied units—even if their loss rates are not statistically different.

Table 3: Sectors Experiencing Atypical Loss Rates in Providence, 1998–2011⁹

Characteristics	Present in 1998	Total lost	Percent lost
<i>Housing stock</i>	415,400	3,900	0.9%
<i>Occupancy status</i>			
Occupied	379,500	3,200	0.8%
Vacant	28,600	700	2.4%
<i>Tenure</i>			
Owner-occupied	239,900	1,300	0.5%
Renter-occupied	139,600	1,700	1.2%

* Statistically different from either all units or all occupied units, as appropriate, at the 10-percent level.

** Statistically different from either all units or all occupied units, as appropriate, at the 5-percent level.

*** Statistically different from either all units or all occupied units, as appropriate, at the 1-percent level.

Table 3 reports that no market segments had loss rates statistically different from the benchmark rates. The low overall loss rate and the small sample probably produced this result.

The 80,200 additions reported in Table 2 represent 13.8 percent of the 2011 housing stock. The rate of addition varied by the characteristics of the housing. Additions represented 14.0 percent of occupied units.

We examined all of the components of the 1998 Providence housing stock contained in the four backward-looking tables in Appendix B to identify subgroups with unusual addition rates. Backward-Looking Table A reports information on all units in the stock; Table 4 lists subgroups

⁹ Two conditions were necessary for a housing sector to appear in Table 3, one mathematical and one judgmental: (1) the difference between the sector's loss rate and the benchmark rate had to have been statistically significant at the 10-percent level, and (2) the difference had to be interesting. Counts are rounded to the nearest hundred.

from Table A with addition rates statistically different from the addition rate of the overall stock. Backward-Looking Tables B, C, and D describe important characteristics of occupied units and their residents; Table 4 lists subgroups from those tables with addition rates statistically different than the addition rate of occupied units. We also employed judgment in selecting among components with statistically different addition rates. In general, we looked for subgroups with addition rates less than half or more than double the benchmark rate, but we listed other subgroups if their inclusion illustrated interesting patterns within addition rates. Finally, Table 4 includes the addition rates for four key segments of the housing market—occupied units, vacant units, owner-occupied units, and renter-occupied units—even if their addition rates are not statistically different.

Table 4: Sectors Experiencing Atypical Rates of Addition in Providence, 1998–2011¹⁰

Characteristics	Present in 2011	Total additions	Percent additions
<i>Housing stock</i>	583,000	80,200	13.8%
<i>Occupancy status</i>			
Occupied	522,100	73,000	14.0%
Vacant	54,600	5,600	10.3%
Seasonal	6,300	1,600	25.3% *
<i>Units in structure</i>			
1, detached	315,800	52,500	16.6% **
1, attached	18,900	8,300	43.7% ***
2 to 4	142,200	10,800	7.6% ***
10 to 19	26,600	1,100	4.2% ***
50 or more	30,700	2,500	8.2% *
<i>Rooms</i>			
3	69,100	5,100	7.4% ***
4	111,800	8,100	7.3% ***
7	69,500	13,900	20.0% **
8	46,700	11,100	23.8% ***
9	18,800	6,000	31.8% ***
10 or more	14,400	3,300	23.2% *
<i>Bedrooms</i>			
1	82,700	7,300	8.8% ***
2	189,500	17,700	9.3% ***
4 or more	85,200	21,600	25.4% ***
<i>Multiunit structures</i>	242,600	19,300	7.9% ***
<i>Stories in structure</i>			
2	64,900	5,100	7.8% ***
3	121,300	10,600	8.7% ***
4 to 6	36,800	2,800	7.6% ***
<i>Water</i>			
Well serving 1 to 5 units	60,700	15,900	26.2% ***

¹⁰ Two conditions were necessary for a housing sector to appear in Table 4, one mathematical and one judgmental: (1) the difference between the sector’s addition rate and the benchmark rate had to have been statistically significant at the 10-percent level, and (2) the difference had to be interesting. Counts are rounded to the nearest hundred.

Characteristics	Present in 2011	Total additions	Percent additions
<i>Sewer</i>			
Public sewer	395,100	46,200	11.7% **
Septic tank/cesspool	126,800	26,800	21.2% ***
<i>Age of householder</i>			
75 or older	59,900	3,500	5.8% ***
<i>Children in household</i>			
Some	156,700	31,400	20.0% ***
None	365,400	41,600	11.4% **
<i>Race and ethnicity</i>			
Black alone	27,300	2,400	8.6% *
<i>Tenure</i>			
Owner-occupied	318,600	52,300	16.4% *
Renter-occupied	203,500	20,700	10.2% ***
<i>Renter monthly housing costs</i>			
Less than \$350	34,600	2,400	6.9% ***
\$600 to \$799	33,400	1,000	3.1% ***
\$800 to \$1,249	76,800	5,400	7.0% ***
\$1,250 or more	28,800	8,600	29.8% ***
<i>Renter household income</i>			
Less than \$15,000	64,200	4,800	7.5% ***
\$15,000 to \$29,999	53,900	4,200	7.8% ***
\$30,000 to \$49,999	40,900	3,200	7.9% **
\$100,000 or more	11,700	4,700	40.4% ***
<i>Owner monthly housing costs</i>			
Less than \$350	5,700	300	4.9% *
\$350 to \$599	28,600	900	3.1% ***
\$600 to \$799	34,300	2,400	6.9% ***
\$1,250 or more	187,900	41,800	22.2% ***
<i>Owner household income</i>			
Less than \$15,000	20,300	1,500	7.2% **
\$30,000 to \$49,999	52,400	4,000	7.7% ***
\$100,000 or more	106,300	27,000	25.4% ***

* Statistically different from either all units or all occupied units, as appropriate, at the 10-percent level.

** Statistically different from either all units or all occupied units, as appropriate, at the 5-percent level.

*** Statistically different from either all units or all occupied units, as appropriate, at the 1-percent level.

Table 4 identifies rates of addition that were both atypical of the overall housing stock and statistically significant:

- Units used seasonally in 2011 had a high rate of addition, as did units requiring wells and septic tanks.
- Single-family detached units had a higher-than-average rate of addition; single-family attached units had a very high rate of addition.
- Multifamily units had a lower-than-average rate of addition, and similar lower rates were common among many segments of the multifamily market as defined either by the number of units in a building or the number of floors.

- Unit size mattered. Small units (3 or 4 rooms or 1 or 2 bedrooms) had low rates of addition; large units (7 or more rooms or 4 or more bedrooms) had high rates.
- Units with householders 75 or older in 2011 had a low rate of addition, as did units with Black householders. Units occupied in 2011 by households with children had an above-average rate of addition, while those without children had a below-average rate.
- The rate of addition was low among units that were renter-occupied in 2011 and, among rental units, particularly low for those occupied by households earning less than \$50,000 and those with low monthly housing costs (generally less than \$1,250). Additions were high among high-cost rentals (\$1,250 or more) and among units with households earning \$100,000 or more.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units. Among owner-occupied units, those occupied by lower income owners and those with lower monthly housing costs (less than \$800) had low rates of addition, while those occupied by high-income owners (\$100,000 or more) and those with high monthly housing costs (\$1,250 or more) had high rates of addition.

5. Rental Market Dynamics: 1998–2011

Rental market dynamics focuses on the supply of rental housing and how that supply changes over time. Rental dynamics analysis has many of the features of CINCH analysis. A key step in rental dynamics analysis is to separate the rental stock into classes or strata based on how affordable the units are. This paper uses eight categories:

- Non-market: Either no cash rent or a subsidized rent.
- Extremely low rent: Affordable to renters with incomes less than or equal to 30 percent of local area median income.
- Very low rent: Affordable to renters with incomes greater than 30 percent but less than or equal to 50 percent of local area median income.
- Low rent: Affordable to renters with incomes greater than 50 percent but less than or equal to 60 percent of local area median income.
- Moderate rent: Affordable to renters with incomes greater than 60 percent but less than or equal to 80 percent of local area median income.
- High rent: 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: 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: Affordable to renters with incomes greater than 120 percent of local area median income.

For each category, “affordable” is defined as a gross-rent-to-income ratio of 30 percent or less for the higher of the incomes that define the boundaries for that category.¹¹ The categories are defined relative to area median income; therefore, the boundaries of the categories will change as area median income changes.

Table 5 summarizes what happened to the 1998 rental units by how affordable they were in 1998. It is based on Forward-Looking Rental Dynamics Table 1 in Appendix B, which traces in more detail where these units wound up in 2011.

Table 5: Summary of Forward-Looking Rental Dynamics for Providence

Affordability categories	1998 rental units	To more affordable categories in 2011	In same affordability category in both years	To less affordable categories in 2011	1998 rental units non-rental in 2011
Non-market	39,000	NA	68.2%	21.9%	9.9%
Extremely low rent	9,100	20.3%	5.1%	49.8%	24.9%
Very low rent	51,500	10.6%	30.8%	39.3%	19.3%
Low rent	24,100	22.0%	23.7%	26.1%	28.3%
Moderate rent	22,400	34.6%	30.4%	12.8%	22.1%
High rent	7,100	50.1%	8.2%	6.4%	35.4%
Very high rent	1,300	53.1%	13.6%	0.0%	33.3%
Extremely high rent	700	0.0%	0.0%	NA	0.0%
Total	155,200	15.9%	36.2%	27.7%	20.3%

The 1998 rental stock in Providence was affordable. Of the 155,200 rental units in 1998, 60,600 were extremely low rent or very low rent units. In addition, 39,000 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 64.2 percent of the 1998 rental stock. The three highest rent categories comprised 5.9 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—27.7 percent of all 1998 units compared to 15.9 percent.

By 2011, 20.3 percent of the 155,200 rental units in 1998 were no longer in the rental stock (31,500 units). The largest proportion of these losses was due to changes in tenure, with 19,300 rental units becoming owner-occupied or vacant for sale in 2011. Another 10,000 units became seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 2,200 rental units were no longer in the housing stock in 2011. Some of these losses were permanent; that is, the units were demolished or destroyed. Some losses were potentially reversible, such as units being used for nonresidential purposes. Forward-Looking Rental Dynamics Table 2 shows how the movement out of the rental stock varied across the affordability categories.

¹¹ Gross rent is equal to rent plus utilities.

Table 6 summarizes where the 2011 rental units came from, with respect to 1998, by how affordable they were in 2011. It is based on Backward-Looking Rental Dynamics Table 1 in Appendix B, which traces in more detail the origin of these units.

The rental stock in Providence was less affordable in 2011 than in 1998. Of the 228,500 rental units in 2011, 54,100 were extremely low rent or very low rent units. In addition, 62,500 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 51.0 percent of the 2011 rental stock. The three highest rent categories comprised 9.9 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—25.4 percent of all 2011 units compared to 24.3 percent.

Table 6: Summary of Backward-Looking Rental Dynamics for Providence

Affordability categories	2011 rental units	From more affordable categories in 1998	In same affordability category in both years	From less affordable categories in 1998	2011 rental units non-rental in 1998
Non-market	62,500	NA	63.8%	19.6%	16.6%
Extremely low rent	7,900	12.5%	7.6%	43.8%	36.1%
Very low rent	46,200	13.1%	45.3%	20.8%	20.7%
Low rent	45,800	52.3%	17.3%	12.4%	18.1%
Moderate rent	43,500	44.4%	22.2%	3.3%	30.0%
High rent	14,200	37.8%	6.2%	1.8%	54.2%
Very high rent	5,700	42.4%	6.2%	0.0%	51.4%
Extremely high rent	2,800	0.0%	0.0%	NA	100.0%
Total	228,500	25.4%	35.1%	14.3%	25.2%

Of the 228,500 rental units in 2011, 25.2 percent were not rental in 1998 (57,500 units). The largest proportion of these gains was due to changes in tenure, with 29,100 rental units having been owner-occupied or vacant for sale in 1998. Another 6,200 units had been seasonal units, units occupied by persons with usual residence elsewhere, or units used for migratory workers. Finally, 22,100 rental units had not been in the housing stock in 1998. Of these, 16,600 were added by new construction and 5,500 by other means. Backward-Looking Rental Dynamics Table 2 shows how the movement into the rental stock varied across the affordability categories.

6. Summary of Housing Market Changes: Providence Metropolitan Area, 1998–2011

In 1998 the Providence metropolitan area contained 415,400 housing units, including vacant units. By 2011 the number of housing units had increased to 583,000. This represents an overall increase of 40.3 percent, which translates to an average annual increase of 2.6 percent over the 13-year period. Part of this increase resulted from a redefinition of the metropolitan area, but we do not know how substantially the redefinition affected the observed growth.

The change in the geographical definition of Providence affects the interpretation of the information presented in this report. Our analysis applies only to that portion of the metropolitan area that was common to the Providence metropolitan area as defined in both 1998 and 2011.

Between 1998 and 2011, only 3,900 units left the housing stock. Of these, 1,400 are clearly permanent losses—the original unit is gone, and major construction would be required to replace it with a new unit. Another 700 are temporary losses—the original unit needs repairs or is being used for other purposes. These units may or may not return to the housing stock. Finally, there were 1,700 units that left the housing stock either permanently or temporarily for “other” reasons, a category that encompasses a wide variety of situations. Demolitions and natural disasters accounted for 900 of the permanent losses, while mergers and conversions contributed another 500 permanent losses. The 2011 AHS survey in Providence did not track mobile home move-outs.

In the period between the 1998 and 2011 AHS surveys, 80,200 units were added to the housing stock. Ninety-one percent of these additions were newly constructed units. The 2011 AHS did not track move-ins of mobile homes in Providence. Also, 2,700 new units were formed from the conversion or merger of 1998 units. We classified 3,000 units as recovered because these units had been in the housing stock at some point but were classified in 1998 as nonresidential (2,300) or uninhabitable (700). Finally, 1,800 units were added in other unclassified ways.

The Providence metropolitan area lost 0.9 percent of all 1998 housing units by 2011; additions between 1998 and 2011 represent 13.8 percent of the 2011 housing stock. Additions varied across portions of the Providence housing market defined by the characteristics of the unit or its occupants. We observed the following patterns, which were both atypical of the overall housing stock and statistically significant:

- Single-family detached units had a higher-than-average rate of addition; single-family attached units had a very high rate of addition.
- Multifamily units had a lower-than-average rate of addition, and similar lower rates were common among many segments of the multifamily market as defined either by the number of units in a building or the number of floors.
- Unit size mattered. Small units (3 or 4 rooms or 1 or 2 bedrooms) had low rates of addition; large units (7 or more rooms or 4 or more bedrooms) had high rates.
- Units with householders 75 or older in 2011 had a low rate of addition, as did units with Black householders. Units occupied in 2011 by households with children had an above-average rate of addition, while those without children had a below-average rate.
- The rate of addition was low among units that were renter-occupied in 2011 and, among rental units, particularly low for those occupied by households earning less than \$50,000 and those with low monthly housing costs (generally less than \$1,250). Additions were high among high-cost rentals (\$1,250 or more) and among units with households earning \$100,000 or more.
- The rate of addition among units that were owner-occupied in 2011 was higher than that of all occupied units. Among owner-occupied units, those occupied by lower income

owners and those with lower monthly housing costs (less than \$800) had low rates of addition, while those occupied by high-income owners (\$100,000 or more) and those with high monthly housing costs (\$1,250 or more) had high rates of addition.

The 1998 rental stock in Providence was affordable. Of the 155,200 rental units in 1998, 60,600 were extremely low rent or very low rent units. In addition, 39,000 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 64.2 percent of the 1998 rental stock. The three highest rent categories comprised 5.9 percent of the rental stock. Moves to a less affordable category (sometimes called gentrification) exceeded moves to a more affordable category (sometimes called filtration)—27.7 percent of all 1998 units compared to 15.9 percent. By 2011, 20.3 percent of the 155,200 rental units in 1998 were no longer in the rental stock (31,500 units). The largest proportion of these losses was due to changes in tenure, with 19,300 rental units becoming owner-occupied or vacant for sale in 2011.

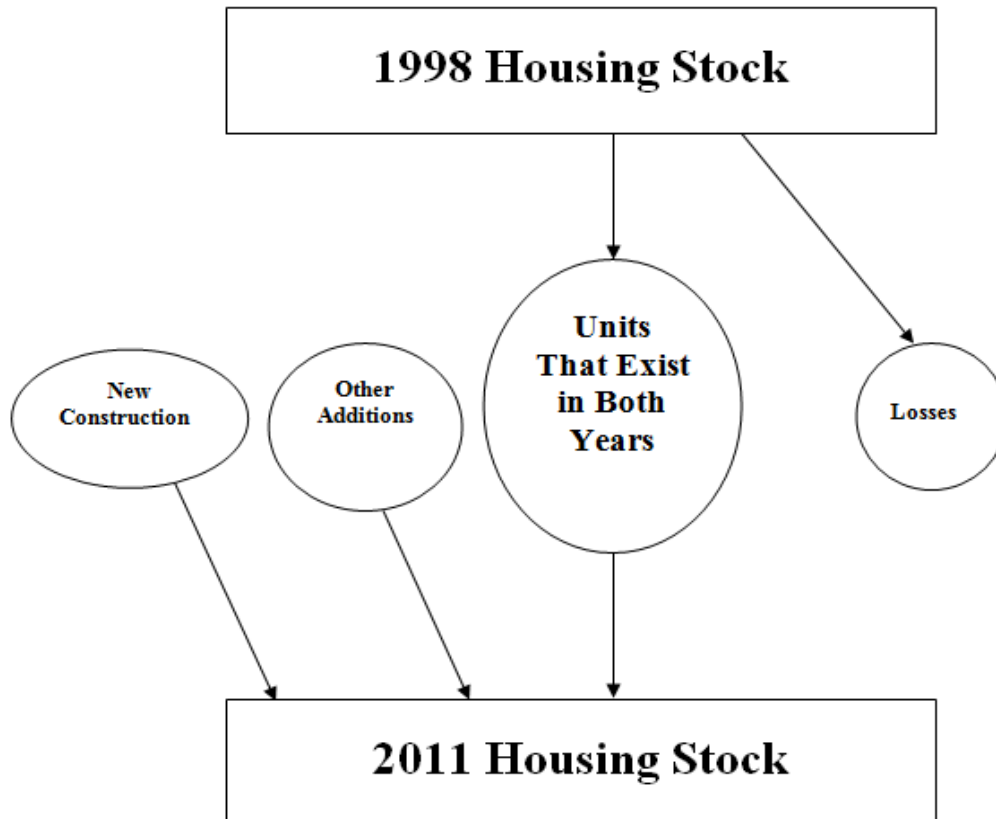
The rental stock in Providence was less affordable in 2011 than in 1998. Of the 228,500 rental units in 2011, 54,100 were extremely low rent or very low rent units. In addition, 62,500 units were non-market; that is, they were either assisted or offered for no cash rent. These three categories accounted for 51.0 percent of the 2011 rental stock. The three highest rent categories comprised 9.9 percent of the rental stock. Moves from a more affordable category (sometimes called gentrification) exceeded moves from a less affordable category (sometimes called filtration)—25.4 percent of all 2011 units compared to 24.3 percent. Of the 228,500 rental units in 2011, 25.2 percent were not rental in 1998 (57,500 units). The largest proportion of these gains was due to changes in tenure, with 29,100 rental units having been owner-occupied or vacant for sale in 1998.

Appendix A: CINCH and Rental Dynamics Methodology

Overview

Components of Inventory Change (CINCH) is a tool used by housing analysts to study how the housing inventory changes over time. Figure 1 illustrates how the inventory evolves.

Figure A-1: How the Housing Inventory Changes



In the context of Figure A-1, the U.S. Census Bureau provides estimates for both rectangles (the 1998 and 2011 housing stocks) and one oval (units added through new construction between 1998 and 2011). No one estimates the other three ovals: the number of units that belong to both the 1998 and 2011 housing stock, units lost to the housing stock between 1998 and 2011, and other additions to the housing stock between 1998 and 2011.

While losses and other additions are small relative to the overall stock, they encompass important features of how housing markets evolve. Housing units are “clumps” of physical capital associated with specific plots of land, and the housing inventory is the aggregation of these capital-land combinations. New construction creates new clumps, and—like all capital—some “clumps” depreciate and disappear. However, housing units undergo other interesting changes. Losses can be either permanent or temporary. Units destroyed by natural disasters or intentionally demolished are permanent losses. Temporary losses include units that are used for

nonresidential purposes and units that are uninhabitable because of structural defects that can be repaired. Additions can result from restoring units that were uninhabitable or converting nonresidential structures into residential structures.

In addition to determining the size of each oval, housing analysts find information about the characteristics of the units in the different ovals useful. Interesting characteristics include structure type, age of the unit, size of the unit, location by region, location by metropolitan status, tenure, household size and composition, resident income, and resident race and ethnicity.

CINCH analysis has three goals:¹²

- To provide an estimate for all six components of Figure A-1.
- To disaggregate losses and other additions into relevant component parts.
- To characterize the units that survive from one period to the next and the units that are added or lost between periods.

The AHS has four features that make CINCH analysis possible:

- Each unit has weights that can be used to estimate its share of the overall stock.
- The AHS tracks new construction and the various types of losses and other additions.
- The AHS has detailed information about the characteristics of each unit and its occupants.
- The AHS tracks the same unit from one period to the next so that changes in status and characteristics can be observed directly.

Housing analysts and policymakers are particularly interested in what happens to affordable rental housing units. Rental dynamics is a form of CINCH analysis that classifies the rental housing stock by affordability level and tracks the evolution of the rental housing stock by affordability class.

¹² Previous CINCH analyses have distinguished between the “status” of a unit with respect to the housing stock (e.g., existing as a nonresidential structure) and the “characteristics” of the unit or its occupants (e.g., rental vs. owner-occupied, or race of householder). This report uses this same distinction. Also adopting previous CINCH terminology, Appendix A will refer to the more recent AHS survey year, 2011, as the current year and the previous AHS survey year, 1998, as the base year.

Why the analysis needs to be separated into two components

It would be possible to list for every AHS sample unit its status and characteristics in both 1998 and 2011. In some cases, there may be no status, (e.g., not yet constructed in 1998) or no characteristics (e.g., no race of householder for vacant units), but with this understanding such a listing would still be possible. From the listing, one could construct an exact accounting of the movement of units among the various statuses and characteristics between 1998 and 2011.

The exact accounting would apply only to AHS sample observations, roughly a 1-in-500 picture of the housing stock at the metropolitan level. To obtain estimates of the magnitude of actual changes in the housing stock, one needs to apply weights to the sampled units. When weights are applied, the accounting will no longer be exact because units have different weights in different years.¹³ For example, the exact accounting might show that 2,500 sample units that were rental in 1998 became owner-occupied or vacant for sale in 2011. To estimate the number of units in the national housing stock that were rental in 1998 and became owner-occupied in 2011, one would need to apply weights. However, using 1998 weights would produce a different estimate than using 2011 weights. There is no conceptual reason to favor the answer using 1998 weights over the answer using 2011 weights. The choice of weights depends upon how the intended analysis will be used.

For this reason, previous CINCH analyses have distinguished between:

1. *Forward-looking analysis*; that is, starting with the base-year stock (1998) and determining the status and characteristics of *those* units in the current year (2011). The goal is to explain what happened to the units comprising the housing stock in the base year. Forward-looking analysis takes the housing stock as given in the base year and looks at the destination of these units in the current year.
2. *Backward-looking analysis*; that is, starting from the current year (2011) stock and determining the status and characteristics of *those* units in the base year (1998). The goal here is to explain where the units comprising the current year housing stock came from. Backward-looking analysis takes the current-year housing stock as given and looks at the source of these units, either in the base year or in new construction or other additions.

¹³ The Census Bureau assigns both a pure weight (the inverse of the probability of selection) and a final weight to each AHS observation. The final weights are designed to sum up to independent estimates of the total housing stock. The pure weights will vary over observations within a given AHS survey because of stratification in drawing the sample. Generally, pure weights do not vary across survey years. The final weights will differ over observations within a given AHS because the Census Bureau makes adjustments for various factors affecting the sample. The final weights of a given observation will also vary between AHS surveys because of changes in the housing stock.

Why changes in geography boundaries affect CINCH analysis

The analysis in this report applies only to that portion of the metropolitan area that was common to the metropolitan area as defined in both 1998 and 2011, and the application to the common area is not precise for the following reasons:

- For forward-looking analysis (1998 to 2011), we observe only those sample units in the geography common to both 1998 and 2011. Thus the observed changes correctly apply only to the common area. However, the forward-looking weights are based by necessity on the entire 1998 geography. Since the common area is smaller than the 1998 geography, the counts are overestimates for the common area.
- For the backward-looking analysis (2011 from 1998), we observe (a) sample units that were in the common area in 1998 and are still in the stock in 2011, (b) sample units representing additions to the stock throughout the metropolitan area as newly defined, and (c) sample units that represent housing existing in 1998 in the added portion of the metropolitan area. We can eliminate (c) and try to focus the analysis on the common area, but there are two problems. The backward-looking weights are based by necessity on the entire 2011 geography. Since the common area is smaller than the 2011 geography, the counts are overestimates for the common area. Moreover, we cannot determine which newly added sample units in (b) represent the common area and which represent the added portion of the metropolitan area. Therefore, additions are overestimated with respect to the common area.

Appendix B: CINCH and Rental Dynamics Tables

Contents

This appendix contains 12 detailed CINCH and rental dynamics tables that have been featured in previous reports. There are:

- Four forward-looking CINCH tables that track changes to the 1998 housing stock in 2011 by various characteristics of the units or their occupants.
- Four backward-looking CINCH tables that track where the 2011 housing stock originated by various characteristics of the units or their occupants.
- Two forward-looking rental dynamics tables (one with counts and one with percentages) that track by affordability category what happened to the 1998 rental stock by 2011.
- Two backward-looking rental dynamics tables (one with counts and one with percentages) that track by affordability category where the 2011 rental stock came from with respect to 1998.

Appendix B begins with an explanation of how to read the tables.

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. All counts are rounded to the nearest hundred.

The forward-looking tables report what happened to the 1998 housing stock by 2011. There are three possible dispositions of 1998 units:

- Units that continue to exist in 2011 with the same characteristics (or serving the same market).
- Units that continue to exist in 2011 but with different characteristics (or serving a different market).
- Units that were lost to the stock in 2011.

The backward-looking tables report where the 2011 housing stock came from in reference to 1998. There are three possible sources of 2011 units:

- Units that existed in 1998 with the same characteristics (or serving the same market).

- Units that existed in 1998 but with different characteristics (or serving a different market).
- Units that are additions to the housing stock between 1998 and 2011.

Since the essence of the CINCH analysis is in the columns, we will explain the columns in detail.

Columns Common to Both Forward-Looking and Backward-Looking Tables

The first and last columns contain the row numbers, which are identical for the same tables in the forward-looking and backward-looking sets. Columns A through D 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, occupied units or units built from 1990 through 1994.
- Column B 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 2011 for the backward-looking tables) and (b) satisfying the condition in column A.
- Column C is the CINCH estimate of the number of units from column B 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.
- Column D is the CINCH estimate of the number of units from column B 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. 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 characteristics are considered impossible or unlikely to change.

Columns Unique to Forward-Looking Tables

In the forward-looking tables, columns E through J track what happened to units that were lost from 1998 to 2011.

- Column E is the CINCH estimate of the number of units from column B that are not in the 2011 housing stock because they were merged with other units or converted into multiple units.
- Column F is the CINCH estimate of the number of houses or manufactured homes from column B that were moved out during the period. In most cases, these units were relocated rather than destroyed. The AHS considers them “losses” because a housing unit is a combination of land and capital, and a move breaks that specific combination to

create a new combination at a different location. For this reason, manufactured houses that move from one lot to another are treated as both losses and additions.¹⁴

- Column G is the CINCH estimate of the number of units from column B 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.¹⁵
- Column H is the CINCH estimate of the number of units from column B that were demolished or were destroyed by fires or natural disasters by 2011.
- Column I is the CINCH estimate of the number of units from column B that in 2011 were condemned or were no longer usable for housing because of extensive damage.
- Column J is the CINCH estimate of the number of units from column B that were lost by 2011 for other reasons.

The columns form a closed system. Column B counts the number of units tracked; columns C through J account for all the possible outcomes. Therefore, column B minus the sum of columns C through J always equals zero, except for rounding.

Columns Unique to Backward-Looking Tables

In backward-looking tables, columns E through J track where units came from that are part of the housing stock in 2011 but were not part of the 1998 housing stock.

- Column E is the CINCH estimate of the number of units from column B that were created by the merger or conversion of other units.
- Column F estimates the number of houses or mobile homes from column B that were moved in during the period. For many of the metropolitan areas in the 2011 AHS survey, information on movements was not collected.
- Column G is the CINCH estimate of the number of units from column B that had been nonresidential in 1998.
- Column H is the CINCH estimate of the number of units from column B that were newly constructed between 1998 and 2011. Note: Generally, in Backward-Looking Table A, there will be units in column H with year-built data substantially earlier than the survey year. There are three explanations for this apparent inconsistency. (1) With the exception of manufactured houses, presence in column H is determined by information from the

¹⁴ The AHS does not track what happens to a house or mobile home that is moved off of a lot that is part of the AHS sample, and does not inquire about the previous history of a unit that is moved on to a lot that is part of the AHS sample.

¹⁵ 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. Nonresidential, therefore, means strictly no residential use.

Census Bureau indicating that the unit entered the sample from a listing of new construction; the Census Bureau may be mistaken. (2) Year built is based on information from the respondent; the respondent may be mistaken. (3) An older unit may have undergone substitution renovation that required a new construction permit, but the respondent may have given the original construction date rather than the renovation date. The extent of major renovation occurring in many established neighborhoods throughout the country makes (3) a likely possibility.

- Column I is the CINCH estimate of the number of units from column B that were added by 2011 from units that were structurally unsound in 1998.¹⁶
- Column J is the CINCH estimate of the number of units from column B that were added by 2011 from units that had been temporarily lost to the stock in 1998 for reasons “not classified” or were newly added by “other” means.

In some metropolitan areas, the AHS surveys do not report data for all the rows in the tables in this appendix. The columns for those rows are left blank.

How to read rental dynamics tables

Forward-Looking Rental Dynamics Table 1 details by affordability category how the rental units in the 1998 housing stock relate to the 2011 housing stock. Column A estimates the number of units in each affordability category in 1998. Columns B through L explain where the 1998 rental units fit into the 2011 housing stock.

- If the units are still rental in 2011, they will be counted in columns B through I, depending upon how affordable they are in 2011.
- If the units have become owner-occupied or for vacant for sale, they will be counted in column J.
- Seasonal units, units that are not the primary residence of their occupants, units used for migratory workers, and units that are vacant but not for rent or sale are counted in column K.
- Column L counts 1998 units that are not in the 2011 housing stock; these can be either temporary or permanent losses to the stock.

The sum of columns B through L equals column A, except for rounding.

Forward-Looking Rental Dynamics Table 2 presents the same information as Table 1, but columns B through L are now percentages of column A. Columns B through L sum to 100 percent in each row.

¹⁶ These units had codes that identified them as “occupancy prohibited” or “interior exposed to the elements.”

Backward-Looking Rental Dynamics Table 1 details by affordability category where the rental units in the 2011 housing stock came from with respect to the 1998 housing stock. Column A estimates the number of units in each affordability category in 2011. Columns B through L explain where the 2011 rental units originated.

- If the units were rental in 1998, they will be counted in columns B through I, depending upon how affordable they are in 1998.
- If the units were owner-occupied or for vacant for sale, they will be counted in column J.
- Seasonal units, units that are not the primary residence of their occupants, units used for migratory workers, and units that are vacant but not for rent or sale in 1998 are counted in column K.
- Column L counts rental units that were newly constructed between 1998 and 2011.
- Column M counts rental units that were added to the housing stock after 1998 by other means.

The sum of columns B through M equals column A, except for rounding.

Backward-Looking Rental Dynamics Table 2 presents the same information as Table 1, but columns B through M are now percentages of column A. Columns B through M sum to 100 percent in each row.

These four Rental Dynamics Tables look only at the endpoints of the 13-year period; for example, a unit that is low rent in 1998 and moderate rent in 2011 might have been high rent, owned, or out of the stock at points in between the two surveys. These tables do not track the path of rental units between 1998 and 2011.

Forward-Looking Table A: Housing Characteristics, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
1	Housing stock	415,400	411,500	0	500	0	400	900	300	1,700	1
	Occupancy status										
2	Occupied	379,500	342,100	34,200	400	0	400	400	300	1,600	2
3	Vacant	28,600	4,600	23,300	100	0	0	500	0	100	3
4	Seasonal	7,300	4,500	2,800	0	0	0	0	0	0	4
	Units in structure										
5	1, detached	244,700	242,700	0	300	0	300	700	300	400	5
6	1, attached	12,200	12,100	0	0	0	0	0	0	100	6
7	2 to 4	99,400	97,900	0	200	0	100	200	0	900	7
8	5 to 9	12,300	12,300	0	0	0	0	0	0	0	8
9	10 to 19	14,900	14,800	0	0	0	0	0	0	100	9
10	20 to 49	8,100	8,000	0	0	0	0	0	0	100	10
11	50 or more	18,000	18,000	0	0	0	0	0	0	0	11
12	Manufactured/mobile home	5,700	5,700	0	0	0	0	0	0	0	12

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/ merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
	Year built										
16	1995–1999	10,000	10,000	0	0	0	0	0	0	0	16
17	1990–1994	15,000	15,000	0	0	0	0	0	0	0	17
18	1985–1989	26,900	26,800	0	0	0	0	0	0	100	18
19	1980–1984	22,700	22,700	0	0	0	0	0	0	0	19
20	1975–1979	23,400	23,300	0	0	0	0	0	100	0	20
21	1970–1974	32,400	32,200	0	0	0	0	100	0	100	21
22	1960–1969	46,700	46,100	0	100	0	100	100	0	200	22
23	1950–1959	56,500	56,300	0	100	0	0	100	0	0	23
24	1940–1949	40,400	39,800	0	0	0	100	200	0	200	24
25	1930–1939	29,300	29,000	0	100	0	0	100	100	0	25
26	1920–1929	32,400	32,100	0	100	0	0	0	0	200	26
27	1919 or earlier	79,700	78,200	0	100	0	200	300	100	800	27
	Rooms										
28	1	100	0	0	0	0	100	0	0	0	28
29	2	2,800	200	2,400	0	0	0	0	100	100	29
30	3	47,500	35,700	11,500	100	0	100	0	0	100	30
31	4	81,100	50,200	29,600	200	0	0	100	0	1,000	31
32	5	85,500	46,200	38,700	100	0	0	200	0	200	32
33	6	84,800	38,000	46,400	0	0	0	300	100	0	33
34	7	51,200	18,400	32,200	100	0	100	200	100	100	34
35	8	35,200	13,400	21,600	0	0	0	100	0	0	35
36	9	15,600	3,000	12,600	0	0	0	0	0	0	36
37	10 or more	11,500	4,800	6,500	0	0	100	0	0	100	37

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
	Bedrooms										
38	None	300	0	200	0	0	100	0	0	0	38
39	1	61,700	44,800	16,200	0	0	100	0	100	400	39
40	2	141,400	107,600	32,300	200	0	0	400	0	900	40
41	3	153,000	117,100	34,800	300	0	0	500	100	200	41
42	4 or more	58,900	37,500	21,000	0	0	200	0	100	100	42
43	Multiunit structures	152,700	151,000	0	200	0	100	200	0	1,200	43
	Stories in structure										
44	1	3,900	3,900	0	0	0	0	0	0	0	44
45	2	45,400	45,200	0	0	0	0	0	0	200	45
46	3	76,900	75,700	0	100	0	0	200	0	800	46
47	4 to 6	26,500	26,200	0	100	0	100	0	0	100	47
48	7 or more										48

Forward-Looking Table B: Unit Quality, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
1	Occupied units	379,500	342,100	34,200	400	0	400	400	300	1,600	1
2	With complete kitchen	367,500	322,600	42,100	400	0	300	400	300	1,300	2
3	Lacking complete kitchen facilities	12,000	200	11,400	0	0	100	0	0	200	3
4	With complete plumbing	375,300	335,200	36,800	400	0	400	400	300	1,600	4
5	Lack some plumbing	4,200	0	4,200	0	0	0	0	0	0	5
6	No hot piped water										6
7	No bathtub/shower										7
8	No flush toilet										8
9	No exclusive use	4,200	0	4,200	0	0	0	0	0	0	9
	Water										
10	Public/private water	338,900	303,800	32,400	400	0	400	400	100	1,400	10
11	Well serving 1 to 5 units	40,600	36,500	3,600	0	0	0	0	200	200	11
12	Other water source										12
	Sewer										
13	Public sewer	261,900	229,600	29,600	300	0	400	300	200	1,500	13
14	Septic tank/cesspool	117,600	82,600	34,500	100	0	0	100	100	100	14
15	Other										15

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
16	Severe problems	5,800	200	5,600	0	0	0	0	0	0	16
17	Plumbing	4,200	0	4,200	0	0	0	0	0	0	17
18	Heating	1,300	0	1,300	0	0	0	0	0	0	18
19	Electric	700	0	700	0	0	0	0	0	0	19
20	Upkeep	200	0	200	0	0	0	0	0	0	20
21	Moderate problems	18,800	1,200	17,100	0	0	100	0	0	400	21
22	Plumbing	200	0	200	0	0	0	0	0	0	22
23	Heating	200	0	200	0	0	0	0	0	0	23
24	Kitchen	12,000	200	11,400	0	0	100	0	0	200	24
25	Upkeep	7,300	200	6,900	0	0	0	0	0	100	25

Forward-Looking Table C: Occupant Characteristics, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
1	Occupied units	379,500	342,100	34,200	400	0	400	400	300	1,600	1
	Age of householder										
2	Under 65	287,300	210,100	74,500	300	0	200	400	300	1,500	2
3	65 to 74	47,400	3,500	43,800	0	0	100	0	0	0	3
4	75 or older	44,800	11,300	33,100	100	0	100	0	0	100	4
	Children in household										
5	Some	135,000	52,400	81,300	100	0	200	200	0	700	5
6	None	244,500	177,200	65,300	300	0	200	200	300	900	6
	Race and ethnicity										
7	White	340,500	292,300	45,500	300	0	300	400	300	1,300	7
8	Hispanic	8,600	3,500	5,000	0	0	0	0	0	100	8
9	Non-Hispanic	331,900	272,100	57,200	300	0	300	400	300	1,200	9
10	Black	13,900	4,300	9,500	100	0	0	0	0	0	10
11	Hispanic	900	0	900	0	0	0	0	0	0	11
12	Non-Hispanic	12,900	3,800	9,000	100	0	0	0	0	0	12
13	American Indian or Alaska Native alone	1,800	0	1,600	0	0	100	0	0	100	13
14	Asian or Pacific Islander	9,100	3,600	5,500	0	0	0	0	0	0	14
16	Other	14,200	0	14,000	0	0	0	0	0	100	16
17	Hispanic or Latino (any race)	20,100	8,700	11,200	0	0	0	0	0	200	17

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
	Income sources of families and primary individuals										
18	Wages and salaries	273,000	193,200	77,300	300	0	100	400	300	1,400	18
20	Dividends, interest, or rent	186,200	63,300	122,000	100	0	100	200	0	400	20
21	Public assistance or public welfare	28,000	900	26,600	100	0	100	0	0	300	21

Forward-Looking Table D: Income and Housing Cost, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
1	Occupied units	379,500	342,100	34,200	400	0	400	400	300	1,600	1
	Tenure										
2	Owner-occupied	239,900	207,500	31,000	200	0	300	300	200	300	2
3	Homeownership rate	63.2%									3
4	Renter-occupied	139,600	98,100	39,700	200	0	100	100	100	1,200	4
	Renter monthly housing costs										
5	No cash rent	4,800	700	3,900	0	0	0	0	0	100	5
6	Less than \$350	29,000	11,500	17,500	0	0	0	0	0	100	6
7	\$350 to \$599	59,300	3,900	54,400	0	0	100	100	100	700	7
8	\$600 to \$799	32,600	1,600	30,600	200	0	0	0	0	200	8
9	\$800 to \$1,249	13,300	1,800	11,500	0	0	0	0	0	100	9
10	\$1,250 or more	500	0	500	0	0	0	0	0	0	10
	Renter household income										
11	Less than \$15,000	55,000	19,200	35,300	100	0	100	0	0	300	11
12	\$15,000 to \$29,999	34,100	5,100	28,900	0	0	0	0	0	100	12
13	\$30,000 to \$49,999	25,800	3,800	21,700	0	0	0	100	0	200	13
14	\$50,000 to \$99,999	12,900	1,900	10,600	0	0	0	0	100	200	14
15	\$100,000 or more	11,700	400	10,800	100	0	0	0	0	300	15

	A	B	C	D	E	F	G	H	I	J	
Row	Characteristics	Present in 1998	1998 units present in 2011	Change in characteristics	1998 units lost due to conversion/merger	1998 house or mobile home moved out	1998 units changed to nonresidential use	1998 units lost through demolition or disaster	1998 units badly damaged or condemned	1998 units lost in other ways	Row
	Owner monthly housing costs										
16	Less than \$350	31,500	2,100	29,000	0	0	200	100	0	0	16
17	\$350 to \$599	64,200	10,100	53,800	100	0	0	0	0	100	17
18	\$600 to \$799	22,000	3,000	18,800	0	0	0	0	100	0	18
19	\$800 to \$1,249	68,300	14,400	53,300	100	0	0	200	100	100	19
20	\$1,250 or more	54,100	38,900	14,900	0	0	100	0	0	100	20
	Owner household income										
21	Less than \$15,000	30,300	2,200	27,900	0	0	100	0	100	0	21
22	\$15,000 to \$29,999	34,700	5,500	28,900	200	0	100	0	0	0	22
23	\$30,000 to \$49,999	50,800	10,600	39,900	0	0	0	100	100	100	23
24	\$50,000 to \$99,999	90,200	28,300	61,400	0	0	100	200	0	200	24
25	\$100,000 or more	33,900	16,600	17,300	0	0	0	0	0	0	25

Backward-Looking Table A: Housing Characteristics, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
1	Housing stock	583,000	502,800	0	2,700	0	2,300	72,800	700	1,800	1
	Occupancy status										
2	Occupied	522,100	413,800	35,300	2,300	0	1,700	66,800	400	1,800	2
3	Vacant	54,600	7,100	41,900	300	0	600	4,400	300	0	3
4	Seasonal	6,300	2,400	2,300	0	0	0	1,600	0	0	4
	Units in structure										
5	1, detached	315,800	263,300	0	0	0	0	51,200	400	800	5
6	1, attached	18,900	10,600	0	300	0	800	6,400	0	600	6
7	2 to 4	142,200	131,400	0	2,300	0	500	7,400	300	300	7
8	5 to 9	25,000	21,900	0	0	0	600	2,500	0	0	8
9	10 to 19	26,600	25,500	0	0	0	300	800	0	0	9
10	20 to 49	18,100	16,400	0	0	0	0	1,700	0	0	10
11	50 or more	30,700	28,200	0	0	0	0	2,500	0	0	11
12	Manufactured/mobile home	5,800	5,600	0	0	0	0	200	0	0	12

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
	Year built										
13	2010–2014	3,600	0	0	0	0	0	3,600	0	0	13
14	2005–2009	33,000	300	0	0	0	0	31,700	0	1,000	14
15	2000–2004	26,900	0	0	0	0	0	26,900	0	0	15
16	1995–1999	22,800	11,700	0	0	0	300	10,500	0	300	16
17	1990–1994	17,900	17,600	0	0	0	300	0	0	0	17
18	1985–1989	33,700	33,300	0	0	0	300	0	200	0	18
19	1980–1984	29,700	29,700	0	0	0	0	0	0	0	19
20	1975–1979	30,200	29,900	0	300	0	0	0	0	0	20
21	1970–1974	42,000	41,800	0	0	0	300	0	0	0	21
22	1960–1969	57,200	57,200	0	0	0	0	0	0	0	22
23	1950–1959	65,400	65,400	0	0	0	0	0	0	0	23
24	1940–1949	48,000	47,400	0	700	0	0	0	0	0	24
25	1930–1939	35,900	35,600	0	300	0	0	0	0	0	25
26	1920–1929	42,000	41,100	0	300	0	300	0	0	300	26
27	1919 or earlier	94,600	92,000	0	1,000	0	800	0	500	300	27

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
	Rooms										
28	1	1,400	0	1,000	0	0	0	400	0	0	28
29	2	4,400	300	3,400	0	0	300	400	0	0	29
30	3	69,100	52,400	11,600	1,000	0	600	3,300	0	300	30
31	4	111,800	64,400	39,200	700	0	900	6,400	200	0	31
32	5	128,900	56,300	57,000	300	0	500	13,800	300	600	32
33	6	118,000	44,500	57,400	0	0	0	15,700	0	300	33
34	7	69,500	21,100	34,500	700	0	0	13,100	200	0	34
35	8	46,700	15,200	20,300	0	0	0	10,800	0	300	35
36	9	18,800	3,400	9,400	0	0	0	6,000	0	0	36
37	10 or more	14,400	5,300	5,800	0	0	0	3,100	0	300	37
	Bedrooms										
38	None	3,500	0	3,100	0	0	0	400	0	0	38
39	1	82,700	64,700	10,800	1,000	0	900	4,800	0	600	39
40	2	189,500	135,500	36,300	1,000	0	1,400	14,400	200	600	40
41	3	222,100	135,700	53,100	700	0	0	32,100	500	0	41
42	4 or more	85,200	42,500	21,100	0	0	0	21,000	0	600	42
43	Multiunit structures	242,600	223,300	0	2,300	0	1,400	14,900	300	300	43
	Stories in structure										
44	1	5,800	5,000	0	0	0	0	800	0	0	44
45	2	64,900	59,800	0	700	0	300	4,100	0	0	45
46	3	121,300	110,700	0	1,700	0	1,100	7,500	0	300	46
47	4 to 6	36,800	34,000	0	0	0	0	2,500	300	0	47
48	7 or more	13,800	13,800	0	0	0	0	0	0	0	48

Backward-Looking Table B: Unit Quality, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/ merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
1	Occupied units	522,100	413,800	35,300	2,300	0	1,700	66,800	400	1,800	1
2	With complete kitchen	504,300	387,900	44,900	1,700	0	1,700	66,000	400	1,800	2
3	Lacking complete kitchen facilities	17,800	300	16,100	700	0	0	800	0	0	3
4	With complete plumbing	517,500	405,200	39,700	2,300	0	1,700	66,400	400	1,800	4
5	Lack some plumbing	4,600	0	4,200	0	0	0	400	0	0	5
6	No hot piped water										6
7	No bathtub/shower	200	0	200	0	0	0	0	0	0	7
8	No flush toilet	500	0	500	0	0	0	0	0	0	8
9	No exclusive use	4,100	0	3,700	0	0	0	400	0	0	9
	Water										
10	Public/private water	461,400	370,400	33,900	2,300	0	1,700	51,400	200	1,500	10
11	Well serving 1 to 5 units	60,700	41,400	3,400	0	0	0	15,400	200	300	11
12	Other water source										12
	Sewer										
13	Public sewer	395,100	285,000	63,900	1,300	0	1,700	41,700	200	1,300	13
14	Septic tank/cesspool	126,800	93,300	6,700	1,000	0	0	25,100	200	600	14
15	Other	200	0	200	0	0	0	0	0	0	15

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
16	Severe problems	8,100	300	6,400	0	0	0	1,300	0	0	16
17	Plumbing	4,600	0	4,200	0	0	0	400	0	0	17
18	Heating	3,200	0	2,300	0	0	0	900	0	0	18
19	Electric										19
20	Upkeep	300	0	300	0	0	0	0	0	0	20
21	Moderate problems	22,500	1,600	18,800	700	0	300	1,100	0	0	21
22	Plumbing	1,100	0	1,100	0	0	0	0	0	0	22
23	Heating	900	0	600	0	0	300	0	0	0	23
24	Kitchen	17,800	300	16,100	700	0	0	800	0	0	24
25	Upkeep	4,100	300	3,400	0	0	0	300	0	0	25

Backward-Looking Table C: Occupant Characteristics, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
1	Occupied units	522,100	413,800	35,300	2,300	0	1,700	66,800	400	1,800	1
	Age of householder										
2	Under 65	397,400	252,500	83,400	2,000	0	1,100	57,200	400	900	2
3	65 to 74	64,700	4,300	52,600	300	0	300	6,700	0	600	3
4	75 or older	59,900	14,300	42,100	0	0	300	2,900	0	300	4
	Children in household										
5	Some	156,700	62,600	62,800	700	0	300	30,000	200	300	5
6	None	365,400	217,700	106,100	1,700	0	1,400	36,800	200	1,500	6
	Race and ethnicity										
7	White	472,400	350,300	55,400	2,300	0	1,700	61,000	200	1,500	7
8	Hispanic	46,700	4,400	36,100	0	0	500	5,600	0	0	8
9	Non-Hispanic	425,700	324,100	41,100	2,300	0	1,100	55,400	200	1,500	9
10	Black	27,300	5,300	19,600	0	0	0	2,000	0	300	10
11	Hispanic	4,000	0	4,000	0	0	0	0	0	0	11
12	Non-Hispanic	23,200	4,800	16,100	0	0	0	2,000	0	300	12
13	American Indian or Alaska Native alone	2,900	0	2,400	0	0	0	600	0	0	13
14	Asian or Pacific Islander	15,900	4,200	8,300	0	0	0	3,200	200	0	14
16	Other	3,600	0	3,600	0	0	0	0	0	0	16
17	Hispanic or Latino (any race)	53,000	10,800	35,700	0	0	500	6,000	0	0	17

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
	Income sources of families and primary individuals										
18	Wages and salaries	370,900	229,400	84,000	2,000	0	800	53,400	400	900	18
20	Dividends, interest, or rent	148,300	73,200	51,800	0	0	0	21,900	200	1,200	20
21	Public assistance or public welfare	11,100	1,100	8,100	0	0	0	1,800	0	0	21

Backward-Looking Table D: Income and Housing Cost, Providence

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
1	Occupied units	522,100	413,800	35,300	2,300	0	1,700	66,800	400	1,800	1
	Tenure										
2	Owner-occupied	318,600	235,800	30,500	0	0	300	51,000	400	600	2
3	Homeownership rate	61.0%									3
4	Renter-occupied	203,500	133,500	49,300	2,300	0	1,400	15,800	0	1,200	4
	Renter monthly housing costs										
5	No cash rent	8,500	900	7,000	0	0	0	400	0	300	5
6	Less than \$350	34,600	17,400	14,800	0	0	0	2,400	0	0	6
7	\$350 to \$599	21,400	5,400	13,400	700	0	900	1,200	0	0	7
8	\$600 to \$799	33,400	2,200	30,200	300	0	0	400	0	300	8
9	\$800 to \$1,249	76,800	2,200	69,200	300	0	300	4,700	0	0	9
10	\$1,250 or more	28,800	0	20,200	1,000	0	300	6,700	0	600	10
	Renter household income										
11	Less than \$15,000	64,200	27,700	31,700	300	0	300	4,200	0	0	11
12	\$15,000 to \$29,999	53,900	7,100	42,600	300	0	500	3,100	0	300	12
13	\$30,000 to \$49,999	40,900	5,300	32,400	700	0	300	2,300	0	0	13
14	\$50,000 to \$99,999	32,800	2,600	26,500	300	0	300	2,500	0	600	14
15	\$100,000 or more	11,700	500	6,500	700	0	0	3,800	0	300	15

	A	B	C	D	E	F	G	H	I	J	
Row	2011 characteristics	Present in 2011	2011 units present in 1998	Change in characteristics	2011 units added by conversion/merger	2011 house or mobile home moved in	2011 units added from nonresidential use	2011 units added by new construction	2011 units added from temporary losses in 1998 stock	2011 units added in other ways	Row
	Owner monthly housing costs										
16	Less than \$350	5,700	2,400	3,000	0	0	300	0	0	0	16
17	\$350 to \$599	28,600	11,200	16,500	0	0	0	900	0	0	17
18	\$600 to \$799	34,300	3,500	28,500	0	0	0	2,000	0	300	18
19	\$800 to \$1,249	62,100	16,500	38,500	0	0	0	6,800	200	0	19
20	\$1,250 or more	187,900	44,000	102,100	0	0	0	41,300	200	300	20
	Owner household income										
21	Less than \$15,000	20,300	2,500	16,300	0	0	0	1,500	0	0	21
22	\$15,000 to \$29,999	35,200	6,300	24,200	0	0	0	4,500	200	0	22
23	\$30,000 to \$49,999	52,400	11,900	36,500	0	0	0	4,000	0	0	23
24	\$50,000 to \$99,999	104,400	32,400	56,800	0	0	300	14,900	0	0	24
25	\$100,000 or more	106,300	18,700	60,600	0	0	0	26,100	200	600	25

Forward-Looking Rental Dynamics Table 1: Counts, 1998–2011, Providence

Affordability categories	A Total in 1998	B Non-market in 2011	C Extremely low rent in 2011	D Very low rent in 2011	E Low rent in 2011	F Moderate rent in 2011	G High rent in 2011	H Very high rent in 2011	I Extremely high rent in 2011	J Owner- occupied in 2011	K Seasonal or related vacant in 2011	L Lost to stock in 2011
Non-market	39,000	26,600	700	2,200	2,300	3,000	0	200	0	2,700	1,000	200
Extremely low rent	9,100	1,900	500	2,400	2,000	200	0	0	0	1,700	500	100
Very low rent	51,500	4,500	900	15,900	13,600	5,500	900	200	0	5,400	3,600	1,000
Low rent	24,100	900	1,100	3,300	5,700	5,400	700	200	0	3,400	2,700	700
Moderate rent	22,400	900	500	2,400	4,000	6,800	2,200	700	0	3,100	1,800	100
High rent	7,100	500	0	1,600	400	1,100	600	500	0	2,200	200	100
Very high rent	1,300	200	0	200	0	0	200	200	0	400	0	0
Extremely high rent	700	0	0	0	0	0	0	0	0	400	200	0
Total	155,200	35,500	3,700	28,000	28,000	22,000	4,600	2,000	0	19,300	10,000	2,200

Forward-Looking Rental Dynamics Table 2: Row Percentages, 1998–2011, Providence

Affordability categories	A Total in 1998	B Non-market in 2011	C Extremely low rent in 2011	D Very low rent in 2011	E Low rent in 2011	F Moderate rent in 2011	G High rent in 2011	H Very high rent in 2011	I Extremely high rent in 2011	J Owner- occupied in 2011	K Seasonal or related vacant in 2011	L Lost to stock in 2011
Non-market	39,000	68.2%	1.8%	5.8%	6.0%	7.8%	0.0%	0.6%	0.0%	6.9%	2.4%	0.5%
Extremely low rent	9,100	20.3%	5.1%	25.7%	21.4%	2.7%	0.0%	0.0%	0.0%	18.7%	5.1%	1.2%
Very low rent	51,500	8.8%	1.8%	30.8%	26.4%	10.8%	1.7%	0.4%	0.0%	10.5%	6.9%	1.9%
Low rent	24,100	3.7%	4.7%	13.7%	23.7%	22.4%	2.7%	1.0%	0.0%	14.3%	11.2%	2.8%
Moderate rent	22,400	4.0%	2.1%	10.6%	17.9%	30.4%	9.9%	2.9%	0.0%	13.6%	8.0%	0.5%
High rent	7,100	7.0%	0.0%	22.0%	5.3%	15.8%	8.2%	6.4%	0.0%	30.8%	3.0%	1.6%
Very high rent	1,300	19.0%	0.0%	17.4%	0.0%	0.0%	16.6%	13.6%	0.0%	33.3%	0.0%	0.0%
Extremely high rent	700	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	155,200	22.9%	2.4%	18.0%	18.0%	14.3%	2.9%	1.3%	0.0%	12.5%	6.4%	1.4%

Backward-Looking Rental Dynamics Table 1: Counts, 1998–2011, Providence

Affordability categories	A Total in 2011	B Non- market in 1998	C Extremely low rent in 1998	D Very low rent in 1998	E Low rent in 1998	F Moderate rent in 1998	G High rent in 1998	H Very high rent in 1998	I Extremely high rent in 1998	J Owner- occupied in 1998	K Seasonal or related vacant in 1998	L New construction	M Added in other ways
Non-market	62,500	39,900	2,900	6,000	1,200	1,200	600	300	0	4,600	1,600	3,900	300
Extremely low rent	7,900	1,000	600	1,200	1,600	700	0	0	0	500	900	1,100	300
Very low rent	46,200	3,000	3,100	21,000	4,200	3,100	2,000	300	0	5,200	1,200	1,400	1,800
Low rent	45,800	3,100	2,500	18,300	7,900	5,100	600	0	0	5,100	1,200	1,100	1,000
Moderate rent	43,500	4,100	300	7,100	7,800	9,700	1,500	0	0	8,300	800	3,300	600
High rent	14,200	0	0	1,200	900	3,200	900	300	0	2,900	500	3,400	900
Very high rent	5,700	300	0	300	300	800	700	400	0	1,500	0	700	700
Extremely high rent	2,800	0	0	0	0	0	0	0	0	1,000	0	1,700	0
Total	228,500	51,400	9,300	55,200	23,900	23,800	6,200	1,300	0	29,100	6,200	16,600	5,500

Backward-Looking Rental Dynamics Table 2: Row Percentages, 1998–2011, Providence

Affordability categories	A Total in 2011	B Non- market in 1998	C Extremely low rent in 1998	D Very low rent in 1998	E Low rent in 1998	F Moderate rent in 1998	G High rent in 1998	H Very high rent in 1998	I Extremely high rent in 1998	J Owner- occupied in 1998	K Seasonal or related vacant in 1998	L New construction	M Added in other ways
Non-market	62,500	63.8%	4.6%	9.7%	2.0%	1.9%	1.0%	0.5%	0.0%	7.4%	2.5%	6.3%	0.4%
Extremely low rent	7,900	12.5%	7.6%	15.7%	19.8%	8.3%	0.0%	0.0%	0.0%	6.4%	11.6%	13.9%	4.2%
Very low rent	46,200	6.5%	6.6%	45.3%	9.0%	6.8%	4.2%	0.7%	0.0%	11.3%	2.7%	2.9%	3.8%
Low rent	45,800	6.8%	5.4%	40.1%	17.3%	11.1%	1.2%	0.0%	0.0%	11.1%	2.5%	2.3%	2.1%
Moderate rent	43,500	9.4%	0.7%	16.3%	18.0%	22.2%	3.3%	0.0%	0.0%	19.0%	1.9%	7.7%	1.5%
High rent	14,200	0.0%	0.0%	8.6%	6.4%	22.8%	6.2%	1.8%	0.0%	20.4%	3.7%	23.9%	6.2%
Very high rent	5,700	5.3%	0.0%	5.4%	5.3%	14.2%	12.3%	6.2%	0.0%	27.0%	0.0%	12.8%	11.6%
Extremely high rent	2,800	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	37.6%	0.0%	62.4%	0.0%
Total	228,500	22.5%	4.1%	24.2%	10.5%	10.4%	2.7%	0.5%	0.0%	12.7%	2.7%	7.3%	2.4%