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Affordable Housing Needs Study for the Portland Metropolitan Area Draft Final Report

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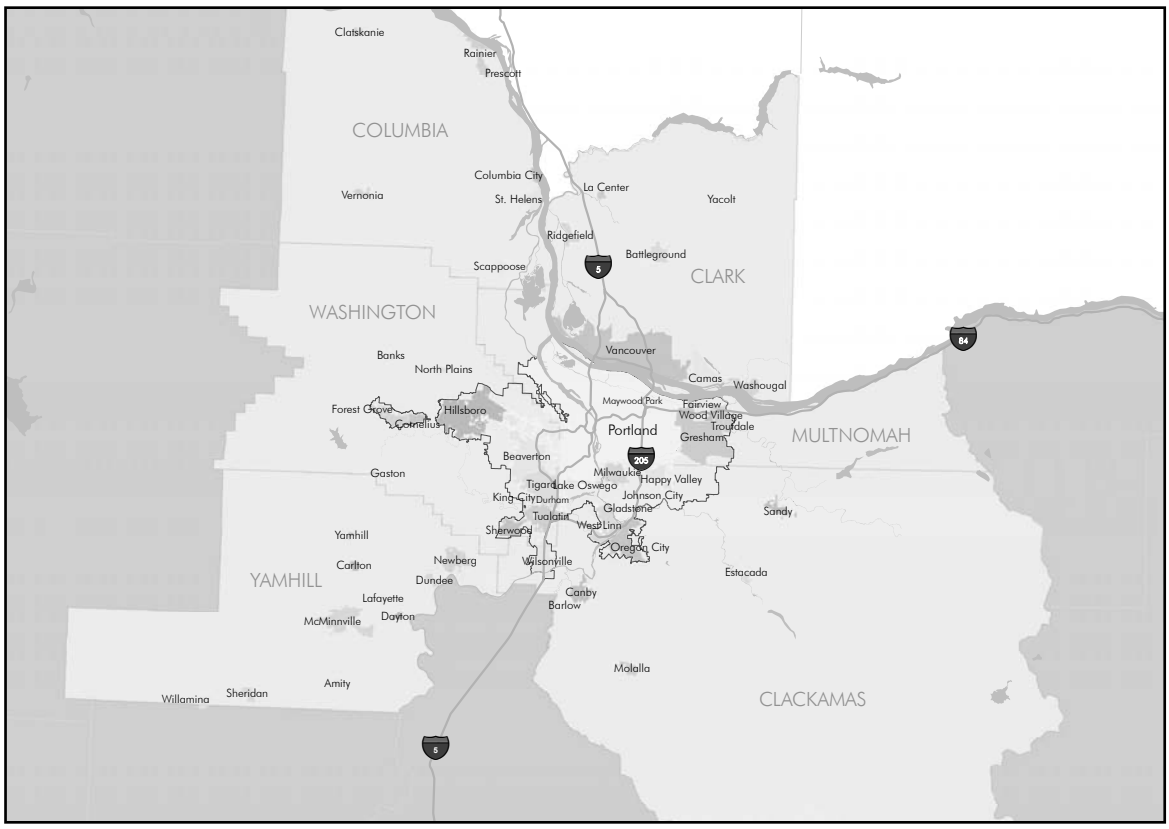


IMS Mission Statement

The Institute of Portland Metropolitan Studies is a service and research center located in the College of Urban and Public Affairs at Portland State University. The mission of the Institute is to serve the communities of the Portland-Vancouver metropolitan area and to further the urban mission of Portland State University by:

- Identifying the most pressing issues facing this metropolitan area and its communities, and developing the data and other information needed to fully communicate their scope and significance;

- Building capacity in the region to address critical metropolitan issues by:

  Brokering partnerships among faculty, students, and area communities to foster new understanding of and/or new strategies for addressing those issues; and

  Acting as a catalyst to bring elected officials, civic and business leaders together in a neutral and independent forum to discuss critical metro politan issues and options for addressing them; and

  Developing new resources to support research and service activities needed to meet those objectives.

By acting effectively on this mission statement, the Institute will enable the:

- University to help advance the economic, environmental, and social goals held by the communities of the region; and

- Communities of this region to act collectively to seek and secure a sustainable future for this metropolitan area.

Executive Summary

The purpose of this report is to respond to the recommendations of the Regional Housing Choice Task Force by providing information to guide housing choice policy for the Metro Council.

In particular, the objectives of this project were to:

- Estimate current and future affordable housing need for the Metro region;
- Describe the distribution of households by income, age, and size across the metro region;
- Describe the tenure of these households and the type of housing they will choose;
- Identify and describe those household types that are most likely to struggle to meet the cost of housing based on their income; and
- Make recommendations for improving analysis of affordable housing need in the future.

Our approach to this task was to use output from the *Metroscope* model, using the base case scenario, to forecast the housing consumption decisions of households from 2005 to 2035. We chose the *Metroscope* model after also considering the State of Oregon's Housing/Land Needs model. We concluded from examining the assumptions and abilities of each model that *Metroscope* is better able to offer the Metro Council the insight into the housing market required to inform housing choice policy.

The *Metroscope* model incorporates housing supply and demand for the entire four-county metropolitan region (Multnomah, Washington, Clackamas, and Clark counties). The region comprises a single housing market; residents travel throughout the region to work, shop, and socialize. Thus, it makes little sense to examine any one county in isolation. While this report does not include the results for Clark County, its impact on demand and supply of housing in the rest of the region is taken into account in the *Metroscope* model and is reflected in the results presented here.

Given the assumptions of the *Metroscope* model (described in Section 2), we address several questions, including:

- Where will household growth occur?
- What kinds of households will grow?
- What kinds of housing will these households live in?
- What percentage of their income will they pay for housing?
- What demographic groups are most cost-burdened and where do those households reside?

Below, we offer a summary our findings regarding each of these questions.

Where will Household growth occur?

The number of households in the three-county portion of the metropolitan region will grow by 59 percent from 2005 to 2035, from 624,700 households in 2005 to 993,900 in 2035 (i.e., under *Metroscope* Base Case Scenario). The subareas with the greatest growth in the number of households include the Happy Valley area (subarea 7) and Canby area (subarea 10). These areas will each grow by about 50,000 households, more than tripling their current numbers.

What kinds of households will grow?

By 2035, the percentage of householders 65 or over will grow from about 18 percent in 2005 to about 27 percent, while the percentage of householders in the other age groups fall slightly. The income distribution of households will also change, with households earning the lowest household income (less than $15,000) rising from 11.3 percent in 2005 to 13.5 percent in 2035. The proportion of households with the highest incomes ($100,000 or more) will also rise from 14.7 percent to 16.4 percent. Household size will be fairly stable between 2005 and 2035. The percentage of households with two people will drop from 32 to 30 percent; the percentage of households with children will remain about the same at just over 35 percent.

What kind of housing will they live in?

From 2005 to 2035, the percentage of renters will fall from 37.9 percent of all households to 32 percent of all households. The share of both rental single family and rental multifamily housing will fall. This loss in market share by rentals is captured in large part by the rise in owner-occupied multifamily housing, which doubles both in raw numbers and in terms of its share of total units, from 4 percent of total households in 2005 to about 8 percent in 2035. Owner-occupied single-family housing will also see its share rise from 58 percent today to 60 percent in 2035.

The demographic groups most likely to choose rental multifamily housing are the young, low-income, single-person households. Rental single-family units attract young, low-income families with children. Owner-occupied single-family housing is chosen by middle-age, middle and upper-income families with children. Owner-occupied multifamily housing is most popular with older, single-person households of all income ranges. Among householders 65 and older, the share living in owner-occupied multifamily housing will rise from just over 4 percent in 2005 to over 10 percent in 2035. However, even for the elderly, owner-occupied multifamily housing is a very small part of the housing market. As discussed in a recent report for Metro by Portland State University (Neil et al. 2006), the probability of moving declines with age; thus, attempts to significantly increase the share of owner-occupied multifamily housing will require appealing to 55-64 year old householders.

What percentage of their income will they pay for housing?

Across the three-county metro region, the percentage of all households paying 30 percent or more of their income for housing is about 43 percent in 2005. By 2035, the percentage of households paying more than 30 percent of their income for housing will rise to about 49 percent. The number of cost-burdened households rises everywhere and the rise is more or less uniform across the region. The largest increases occur in the places at the center of the region--east and west Portland. The only subareas in which the percentage of cost-burdened households falls corresponds roughly to the cities of West Linn (subarea 8), Lake Oswego (subarea 8), and Wilsonville (subarea 10).

What demographic groups are most cost-burdened and where do those households live?

Our analysis of demographic groups is collapsed into housing consumption categories that describe combinations of household characteristics based on their age, income, household size, and presence of children. There are eight consumption categories that describe the full-range of households and their housing characteristics, The lowest-income categories and those with the greatest housing cost burden occur in category 1 (Low-income singles) and category 2 (working class). These households are concentrated in the central areas of the region (subarea 2). This subarea will also experience the greatest increase in these households, although some of the farther out areas such as east county and the near west suburbs will also experience high growth in these low income households. By 2035, 100 percent of the renters in these two bins will pay 30 percent or more of their income for housing. Owners of single-family units in consumption bins 1 (low-income singles) 2 (working class) and 3 (emerging singles) will also have high rates of cost burden as defined by 30 percent of income.

Policy-Relevant Observations

A. While the model predicts that over 43 percent of owners of single-family units and over 60 percent of owners of multi-family units will pay over 30 percent of their income on housing by 2035, this is at least partially offset by the equity that owners build as they make payments on mortgages and as housing values rise. Furthermore, these statistics may overstate the actual cost burden these households feel because we know neither how much wealth these households possess nor the terms of their mortgages. In fact, the American Housing Survey reports that 29 percent of the owner-occupied housing in the Portland region is owned free and clear. For these households, cost burden is clearly overstated.

B. By 2035, about 55 percent of renters of multifamily units will be paying more than 30 percent of their income for housing, and about 38 percent will be paying 40 percent or more of their income for housing. These renters may have a difficult time achieving the savings necessary to change from renters to owners as their current housing situation takes an increasing share of their income.

C. Households trade off housing and transportation costs. The percentage of income that households spend on housing and transportation is relatively stable across the region; some choose more expensive close in housing and save on transportation costs; other choose cheaper housing in the suburbs that requires spending more on travel. We must consider these factors as we consider locations for affordable housing and the transportation options they provide.

Usefulness of Metroscope for Housing Need Analysis

Metroscope is a very valuable tool for the analysis of housing affordability issues. We recommend that the following steps be taken to ensure that it is wisely employed.

- Apply the eight households categories to housing and other housing related analysis so as to enhance understanding land use implications of households consumption decision.
- Widen the pool of analysts that work with the model so that its performance does not rely upon the presence of a few key individuals, and consider converting the software to an open source environment.
- Adapt use of the model to match demographic groups or income groups easily understood by policy makers. Metro might want to consider collecting data in areas that are currently lacking, such as household wealth and transportation costs, and integrating these into the model.
- Engage in more frequent discussions of the model's capabilities for analyzing complex policy questions, especially with different scenarios and model runs.

1 Introduction

In April of 2006, the Metro Council received the recommendations of the Regional Housing Choice Task Force. These recommendations, included, among others, integration of housing supply concerns, and specifically affordable housing, into all policy making and funding allocations.

The Regional Framework Plan specifies that Metro will maintain voluntary affordable housing production goals for the region, to be revised over time as new information becomes available, and that Metro will encourage the adoption of these goals by the cities and counties of the region.

In the past, these voluntary goals were articulated in Table 3.07-7 of the Metro Code, the Five-Year Voluntary Affordable Housing Production Goals. This table lists the number of needed new housing units for households at two household income levels: households earning less than 30 percent of median household income, and households earning 30 to 50 percent of median household income. For a number of reasons, these production goals do not provide sufficient information to Metro or to local governments regarding the affordable housing needs in their communities.

Metro contracted with Portland State University's Population Research Center and the Institute of Portland Metropolitan Studies to provide a more comprehensive analysis of the future affordable housing needs of the region. Using data derived from Metro's econometric model, *Metroscope*, PSU examined the model's predictions about what kinds of households will live in what types of housing. The model predicts these values for five-year increments from 2005 to 2035.

We examined the data to identify patterns of residential consumption. Some of these patterns may not be consistent with a local government's goals for their community. By calling attention to these patterns, we hope to assist in the development of strategies that could lead to outcomes more consistent with a community's housing goals and with our region's plans for growth.

Objectives

The objectives of this project were to:

- Estimate current and future affordable housing need for the Metro region;
- Describe the distribution of households by income, age, and size across the metro region;
- Describe the tenure of these households and the type of housing they will choose;
- Identify and describe those household types that are most likely to struggle to meet the cost of housing based on their income; and
- Make recommendations for improving analysis of affordable housing need in the future.

Legal Framework for the Analysis

Housing Choice Task Force

Created in March of 2005, The Housing Choice Task Force was charged by Metro with examining barriers to the implementation of affordable housing goals in the Metro region. The Task Force spent a year examining and discussing the housing market, housing affordability trends, and barriers to the implementation of affordable housing requirements set by the 2000 Affordable Housing Technical Advisory Committee.

The Task Force's key recommendations include:

1. Integrate housing supply concerns, and specifically affordable housing, into all policy making and funding allocations, and create a permanent Housing Choice Advisory Committee.
2. Direct efforts toward development of a new, permanent regional resource for affordable housing, and lead advocacy for increased funding at the federal, state and regional levels.
3. Promote strategies identified to remove regulatory barriers and reduce the cost of developing housing and affordable housing specifically, especially in centers and corridors as identified in the 2040 Growth Plan.
4. Prioritize the budget for housing to provide technical assistance to local governments, such as land/site inventory, model codes, etc.

Amendment to the Regional Framework Plan

Consistent with the recommendations of the HCTF, Metro amended the Regional Framework Plan and Functional Plan to encourage local governments to implement land use regulations that allow for a diverse range of housing types, including affordable housing, especially in Centers and Corridors. They are also required to report on their progress.

In the past, local governments have been provided with voluntary affordable housing production goals as a simple table (Table 3.07-7) listing for each jurisdiction, the number of units needed that will be affordable for two income ranges: less than 30 percent of median household income and 30 to 50% of median household income.

This simple table provided very little information to local governments regarding

- the size of the households that need these units;
- the age of the households that need these units;
- whether these households have children; or
- whether the new units should be rental or owner units.

This lack of information made it very difficult for local governments to develop policy to encourage production of these units and to understand who would occupy them.

We hope to offer more complete information that will assist Metro and local governments in understanding what kinds of households will be most in need of affordable housing and how they will be distributed around the region. This allows an opportunity to create policies that could change the predicted outcomes.

Uses of the data in this Report

This report contains data from the *Metroscope* model. The model contains a number of assumptions that will be discussed in the next chapter. The important thing to remember when examining these data is that their predictions are based on current policy assumptions; thus, a

change in policy, as with a change in the model's other assumptions, can affect the outcomes predicted in this report. Thus, the data should be used as an indication of issues that may arise in the housing market in the absence of additional policies to change these outcomes. The charts and tables in this report represent a starting point for policy discussions, not a prediction of what will happen.

Furthermore, the data also must be analyzed in the context of the *Metroscope* model's strengths and weaknesses, which we describe in Section 2.

Contents of this Report

This report includes three additional chapters and one appendix.

- Chapter 2 describes our methodology, including describing why we chose the *Metroscope* model to produce the data for the analysis.
- Chapter 3 describes the findings of the *Metroscope* model and contains a number of tables that describe the affordable housing situation from 2005 to 2035.
- Chapter 4 draws conclusions about the model predictions and discusses policy levers that could have a significant impact on those outcomes. It also describes recommendations for improving the accuracy and transparency of the *Metroscope* model and its output.
- The Appendix contains a memo describing in detail why we chose the *Metroscope* model for this analysis.

2 Methodology

Our task of providing richer information about affordable housing needs in the Portland metropolitan region began with choosing a model for the analysis. We first examined the choices available and inventoried their key differences. The Appendix contains a memo detailing this analysis.

This section summarizes our model choice and also explains some of the key assumptions and analysis limitations of the *Metroscope* model, which we chose for the analysis.

For a detailed description of the *Metroscope* model, please refer to "Metroscope: A Forecast Allocation Model & Policy Assessment Tool: A Brief Model Description;" and "Metroscope Documentation." These documents are available from the Data Resources Center staff at Metro.

Choice of Models

We were asked to choose between *Metroscope*, Metro's in-house econometric model, and the State of Oregon's Housing/Land Needs model (State Model) developed by the Oregon Department of Housing and Community Services. In the section below, we summarize the key factors motivating our choice of Metro's *Metroscope* model for this analysis. A more in-depth explanation of the two models is contained in Appendix A, the August 29th memo that contains our recommendations.

The State Housing Model

The State Model was developed as a tool for planning for new affordable housing units in a specified area. A number of smaller communities within Oregon have adopted the Sate model to meet their requirements for affordable housing needs analysis under Goal 10 of the Oregon Statewide Planning Goal.

The State Model forecasts the number of housing units needed at different price levels so that that no one in the forecasted population would be paying more than 30% of their income on housing costs. There are three models, one for each of type of study area: 1) urban, college or resort; 2) medium size rural; and 3) small rural. The State Model may be run for cities, counties, or larger regions, provided appropriate data are available.

The State Model is comprised of a housing needs model and a land needs model. The two models are inter-related, but the housing needs model can be run without the land needs model.

The model predicts the "gap" between the expected future supply and the future demand of housing units by price and tenure. The model also predicts the area's land needs based on the housing gap and the available buildable land.

New housing supply is predicted from the current housing inventory, planned housing on the available buildable land supply by density and zone, expected demolitions of existing units, and expected vacancy. There is no mechanism within the State Model to forecast the production of housing by the private sector based upon building costs, housing prices, and affordability. Instead, the housing that is produced is assumed to equal that allowed by zoning in the community. In that

sense, the State Model is not really an economic model. There is also no mechanism in the State Model for the housing stock to depreciate in value over time.

Future demand for housing units by price of housing and tenure is predicted by household income, the age of the householder, tenure and the price of the home as reported in Census 2000, and by the household's propensity to reside in a home that has housing costs that are either higher or lower than what the household can afford (affordability factors called in and out factors). Housing subsidies also affect housing demand. Since the model does not include transportation factors, housing demand is not affected by expected commuting patterns.

The State Model is a non-equilibrium model that might allow for significant housing shortages. The gap between housing prices and rents and production costs will not stimulate housing development in the State Model.

Metroscope

Metro's model was developed for land use and transportation policy evaluation for the Portland-Vancouver metropolitan region; it has other uses such as transportation planning and Urban Growth Boundary (UGB) analysis. The model's output provides a forecast of where and how much housing will exist in the future. The geographic level for which the output is generated is in Metro defined regions. The whole of the Portland-Vancouver metropolitan area consists of 20 Sub-county Area Districts (Clackamas, Multnomah, and Washington Counties, Oregon and Clark County, Washington). Each District's boundaries follow census tract boundaries and each was designed to represent its fair share of specified population and housing composition in the Portland-Vancouver area.

Metroscope is comprised of 4 inter-related models:

Economic (forecasts region-wide population and employment);

Location (comprised of residential and non-residential sub-models) that predicts where and how much housing will exist in the future based on predictions of how much and where employment activity will occur, the price of housing (incorporates the costs of development, locational amenities, and depreciation in value), household income and other wealth factors, and the age of householder;

Travel (estimates trip origins and destinations, and measures perceived cost of travel between regions which affects where people work and decide to reside); and

GIS/land tools and database (a.k.a. the Land Filter which monitors current residential development, and tracks where and how much land [parcels] will be available for development in the future, provides an inventory and accounting of developable land that is available, and its capacity for housing units and employment). All sub-models are interrelated, and they influence and provide inputs for one another.

For our purposes, the results of *Metroscope* are the future number of households by housing type (single-family, multi-family) and tenure, price levels, age of householder, income level, percent of income spent on housing costs, and household size reorganized into bin categories. The results are produced by location (district). *Metroscope* also produces non-residential results such as the location of commercial property and commuting patterns, which can be used for other planning purposes.

The housing supply/demand results of *Metroscope* are dependent on the region's forecast population, land capacity/amount of developable land available, housing choice (influenced by tenure, age of householder, household income, housing costs, household size and presence of children), and location choice (influenced by availability of housing, neighborhood attraction, distance to available employment opportunities of householder, and the Census 2000 household, income, age structure).

Metroscope is an equilibrium type of model that balances housing demand and housing supply by adjusting vacancy rates, prices, rents, and production. Housing prices and rents are bounded by household incomes to some extent, and housing production is determined partly by land use and zoning policies and by the interaction of rents, prices, and construction costs.

***Metroscope* Output.** The output of the *Metroscope* model will provide us a picture of how households will choose housing based on their income, age, household size, presence of children, and tenure preferences, and how developers will react to the market, regulations, and construction costs. It does not define a "gap" in affordable housing supply because it equilibrates demand and supply and each household chooses housing. However, the gap can be defined as the households paying an unacceptable percentage of their income on housing.

Housing costs in the model include rent or mortgage payment (assuming a 20 percent down payment) utilities, property taxes, household operations and housekeeping supplies.

Why we chose to use Metroscope for this analysis

We chose *Metroscope* for this analysis for the following reasons:

- *Metroscope* integrates the residential housing model with transportation, land use, and commercial location models. Thus, this analysis is consistent with the models and assumptions used for transportation and urban growth boundary (UGB) planning. It can therefore provide a fuller and more realistic model of housing development that incorporates the impact of household choice, development economics, and commuting preferences. These features are absent from the State model.
- *Metroscope's* estimates of the percentage of income spent on housing for the Portland area approach national BLS estimates. Figure A-1 in the Appendix shows that *Metroscope's* estimates of the percent of income spent on housing are within several percentage points of the BLS national estimates for all income levels.
- *Metroscope* can provide an understanding of how policy levers might affect the outcome (e.g. economic incentives for more supply; improved amenities to change demand, changes in zoning or land supply, and investment in transportation infrastructure).
- *Metroscope* can be run in-house by Metro and provides options for analysis at region-wide or other district levels.
- The State housing model does not provide an adequate depiction of the future supply of housing. It assumes that housing will be built as planned rather than by market profitability.
- *Metroscope* is an equilibrium type of model that balances housing demand and housing supply by adjusting vacancy rates, prices, rents, and production. By comparison, the State Model is a non-equilibrium model that might allow for significant housing shortages. The gap between housing prices and rents and production costs will not cause a spurt of housing development in the State Model.

Limitations of Metroscope

While we feel that the *Metroscope* model can provide a more complete picture of the housing market, it does have its limitations, including the following:

- The richness of the *Metroscope* model provides a wealth of information; however, its complexity also requires a careful and clear explanation of the results.
- The treatment of wealth in the model may not adequately account for the wealth effect on the demand for housing, especially among the elderly.

- The value of housing is sensitive to depreciation assumptions, and to assumptions about the annual growth in income.

Obtaining *Metroscope* Data

We obtained Metroscope data from Metro Data Resources Center staff. We used the "base case" scenario, which incorporates the following assumptions:

- Population estimates are derived from the Census Bureaus' middle series birth and death rates, calibrated by age cohort with population data and vital statistics for the region in 2000. They are consistent with state and national forecasts and with historical trends.
- Economic growth and job growth is pegged to a national forecast that calls for moderate future growth trends that taper off in the out years.
- Transportation assumptions are based on the financially constrained Regional Transportation Plan through 2025, with minor arterial upgrades assumed for expansion areas to accommodate urban development densities through 2035.
- A 20-year land supply is maintained in accordance with state law, adding about 6.500 acres within the urban growth boundary every 5 years.

To identify the specific data needed for the analysis, we took the steps described below.

Defining the relevant dimensions of the analysis

Geography. Figure 2-1 shows the geography included in our study; Figure 2-2 shows the same map with city boundaries included. Metro's data is typically divided into 20 subareas. Our analysis generally includes only the Oregon State part of the metropolitan region. Subarea 17, which includes Clark County, was usually removed from our analysis.

Housing type. *Metroscope* data cover the following housing types/tenures:

- renter-occupied single family (RSF);
- owner-occupied single family (OSF);
- rental multi-family (RMF); and
- owner-occupied multi-family (OMF).

Income, age, and household size and presence of children. To simplify the analysis, the *Metroscope* model produces output based on household consumption profiles, also known as bins. These profiles differ between owners and renters. The distribution of households by bin and income, age, household size and presence of children for owner occupied housing and for rental housing are shown in Tables 2-1 and 2-2.

Figures 2-3, and 2-4, and 2-5 provide a graphical representation of the characteristics of each bin, and how these characteristics vary by bin and between renters and owners. As shown in Figure 2-3, income is generally lower for renters than owners for all the consumption bins. For both owners and renters, income increases as we move from one bin to the next. Bin 1 includes very low-income households for both owners and renters, while bin 8 includes the most affluent households in both tenure categories.

Figure 2-4 shows how age varies by consumption bin. Age varies more for renters than for owners. Bin 1 includes many elderly, while bin 2 has a much higher concentration of young adults. The average age rises again for bins 3 and 4 and then falls for bins 5 and 6, rises slightly for 7, then falls again for bin 8. The average age of owners varies much less by bin, although the proportion of the elderly is highest in Bins 1 and 2, while the average age is much lower for bins 3, 4, 5, and 8.

Figure 2-5 shows how household size varies by bin. Household size is generally higher for the higher number bins, although bin 2 renters have a larger household size than renters in bins 3 and 4. Note that presence of school-aged children coincides somewhat with household size; thus, bin 8 renters and owners have both the highest household size and the highest percentage of households with school-aged children.

A summary of the bin characteristics can be described as follows.

- **Bin 1: Low-Income Singles.** For both owners and renters, these are the lowest income households. Among renters, these are exclusively single person households--primarily the elderly. Owners in Bin 1 have a more even age and household size distribution.
- **Bin 2: Working Class**. These households can be any age, but their income is among the lowest. The income distribution is a bit higher for owners than for renters. They are primarily childless. However, one-third of the renter households in this bin have school-aged children, while only about 1 in six of the owners in this bin have school-aged children.
- **Bin 3: Emerging Singles.** With a bit more income than Bin 2 households, these are primarily in the 25-44 age bracket. The renters are mostly single-person households. About half of bin 3 owners are two-person households and one third of the owner households contain school-aged children.
- **Bin 4: Established Singles and Couples.** With a broad age distribution and approaching middle income, these households are usually childless, especially among renters. Owner households in Bin 4 include more people and about 39 percent include school-aged children.
- **Bin 5: Young Middle-income families.** Bin 5 households are larger and wealthier. The Renter households in this category are older than the owners, with smaller household sizes. The owners are more likely than not to have children.
- **Bin 6: Fast Track Families.** With more income than Bin 5 households, almost half of this group is between 25 and 44. Although the majority do not have school-aged children, two- and three-person households are most common, with the owner households larger and more likely to have school-aged children.
- **Bin 7: Successful Middle Aged.** Mostly without children, these households include the very high-income couples, especially for owners. Interestingly, the renter households in Bin 7 are more likely to have children.
- **Bin 8: Movers and Shakers with Kids.** Among owners, most of these households have children; about 60 percent of renter households have children. They are the highest earners in their prime earning years.

Figure 2-1. County Subareas, Metro Region

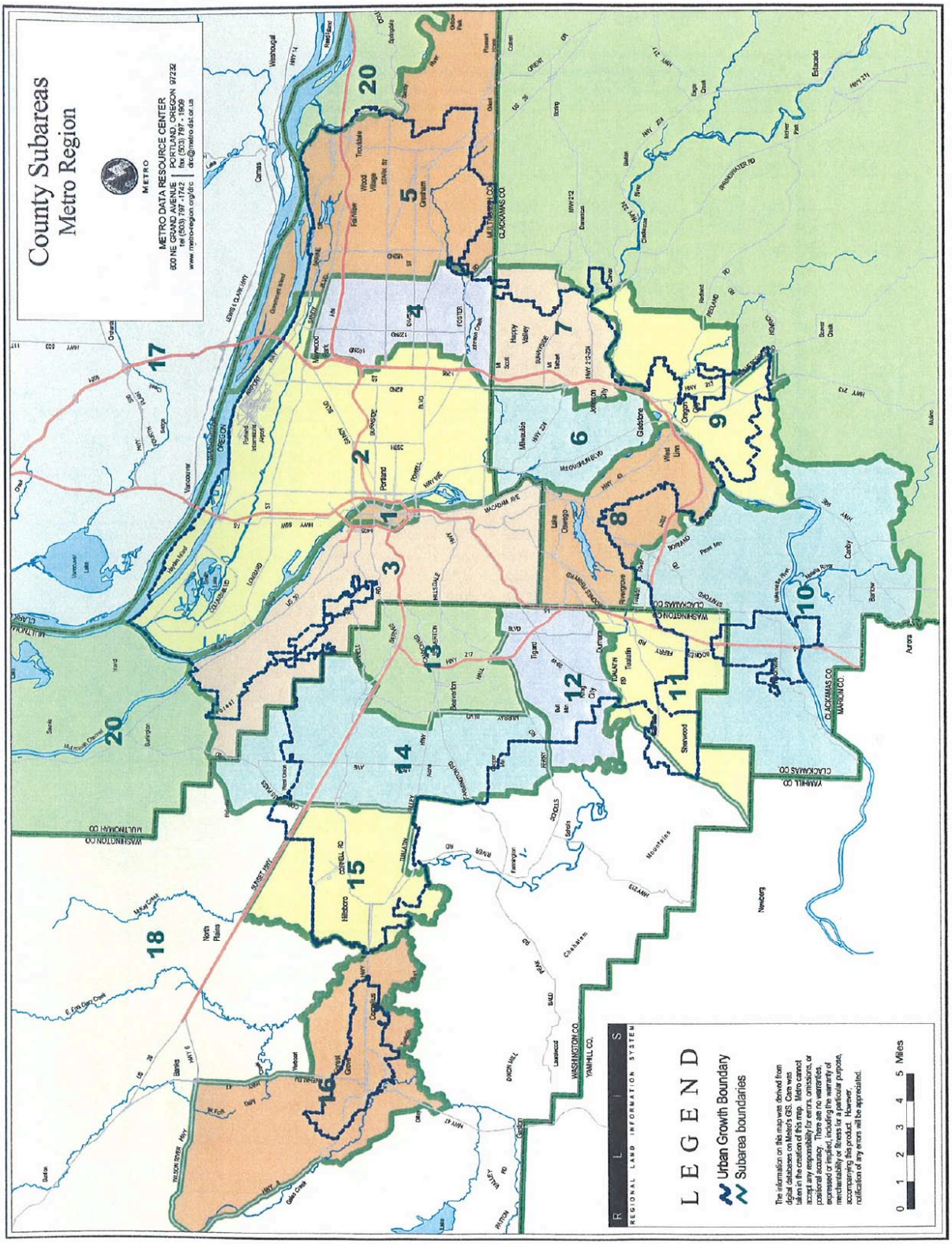


Figure 2-2. County Subareas, Metro Region, with Jurisdictional Boundaries

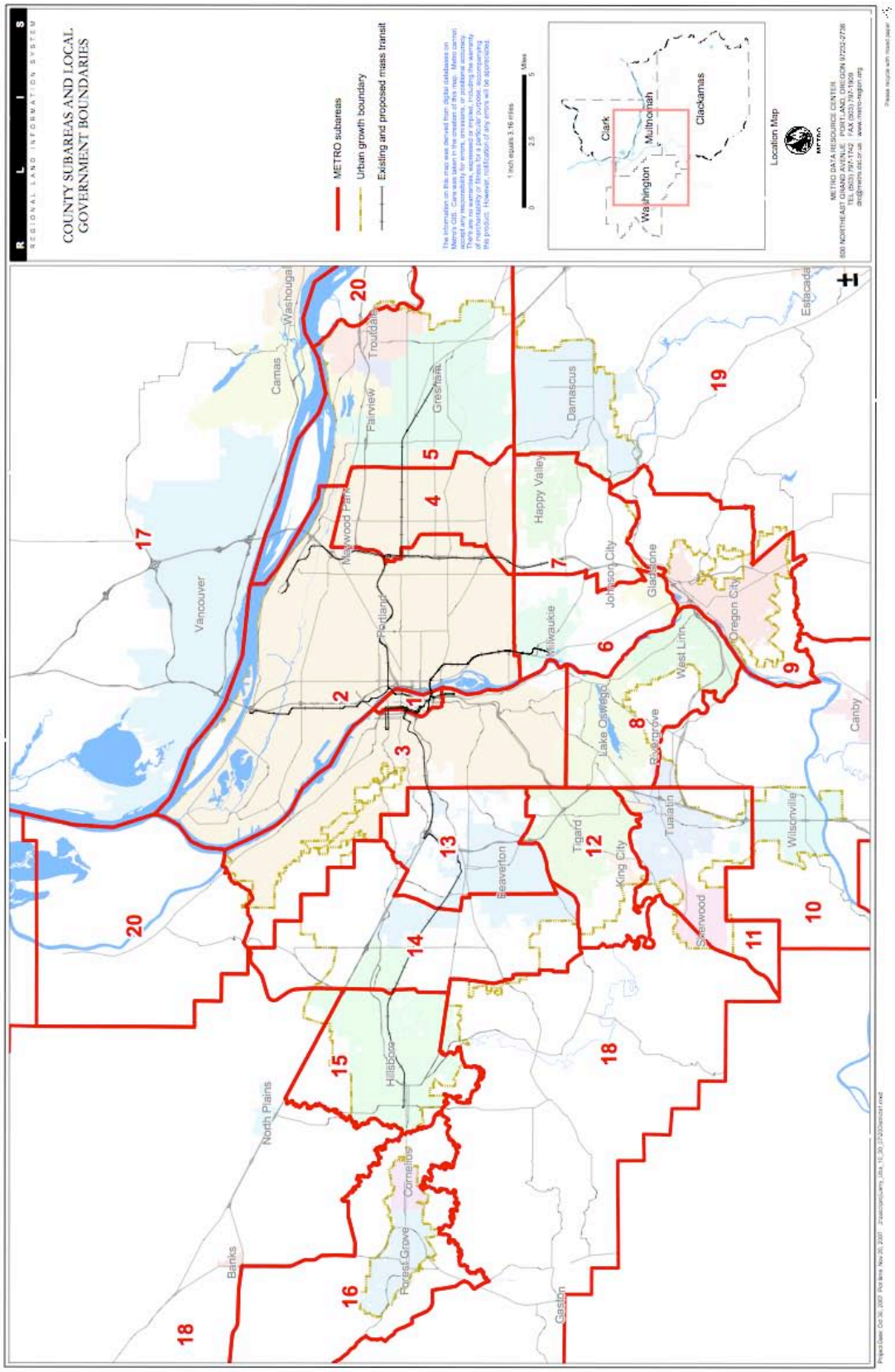


Table 2-1. Metroscope Residential Demographic Summary: Household Distribution by Bin, OWNERS

Age of Householder	Bin 1: Low-Income Singles	Bin 2: Working Class	Bin 3: Emerging Singles	Bin 4: Established Singles and Couples	Bin 5: Young Middle-Income Families	Bin 6: Fast-Track Families	Bin 7: Successful Middle-Aged	Bin 8: Movers & Shakers with Kids	Total HHolds	Percent HHlds
Under 25	12.8%	7.9%	7.0%	5.6%	2.2%	0.9%	1.1%	0.3%	5,158	1.3%
25 - 44	25.9%	26.4%	42.2%	40.4%	49.1%	45.3%	29.9%	53.9%	138,103	35.6%
45 - 54	11.4%	14.5%	19.3%	21.7%	23.6%	26.4%	29.7%	35.6%	98,948	25.5%
55 - 64	12.2%	16.7%	14.0%	16.6%	14.9%	17.2%	24.4%	8.8%	66,093	17.0%
65 and over	37.7%	34.6%	17.4%	15.8%	10.3%	10.2%	14.9%	1.4%	79,825	20.6%
									388,126	100%
Household Income										
LT $15,000	67.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19,135	4.9%
$15,000 - $24,999	32.2%	36.8%	6.1%	0.0%	0.0%	0.0%	0.0%	0.0%	28,678	7.4%
$25,000 - $34,999	0.0%	56.6%	29.7%	9.1%	0.0%	0.0%	0.0%	0.0%	39,269	10.1%
$35,000 - $44,999	0.0%	6.6%	51.1%	28.5%	14.1%	0.0%	0.0%	0.0%	44,160	11.4%
$45,000 - $59,999	0.0%	0.0%	13.1%	54.4%	40.8%	18.7%	0.0%	0.0%	64,245	16.6%
$60,000 - $74,999	0.0%	0.0%	0.0%	8.0%	38.5%	30.2%	14.2%	0.0%	54,190	14.0%
$75,000 - $99,999	0.0%	0.0%	0.0%	0.0%	6.6%	42.9%	19.4%	33.9%	58,871	15.2%
$100,000+	0.0%	0.0%	0.0%	0.0%	0.0%	8.2%	66.4%	66.1%	79,577	20.5%
									388,126	100%
Household Size										
1	73.4%	35.4%	24.6%	7.1%	6.6%	8.2%	0.0%	0.0%	70,273	18.1%
2	13.9%	49.4%	37.2%	44.8%	28.9%	31.4%	51.3%	0.3%	137,842	35.5%
3	6.7%	9.0%	19.7%	21.3%	24.1%	23.0%	28.9%	17.8%	68,444	17.6%
4	3.5%	6.1%	11.6%	17.3%	25.7%	18.1%	4.3%	46.8%	63,086	16.3%
5+	2.5%	0.1%	6.9%	9.5%	14.7%	19.4%	15.5%	35.1%	48,481	12.5%
									388,126	100%
Presence of K-12 Children										
No	98.9%	83.8%	65.9%	61.3%	45.3%	51.8%	70.9%	7.9%	239,598	61.7%
Yes	1.1%	16.2%	34.1%	38.7%	54.7%	48.2%	29.1%	92.1%	148,528	38.3%
									388,126	100%

Table 2-2. *Metroscope* Residential Demographic Summary –Distribution by Bin, RENTERS

Age of Householder	Bin 1: Low-Income Singles	Bin 2: Working Class	Bin 3: Emerging Singles	Bin 4: Established Singles and Couples	Bin 5: Young Middle-Income Families	Bin 6: Fast-Track Families	Bin 7: Successful Middle-Aged	Bin 8: Movers and Shakers with Kids	Total HHolds	Percent HHlds
Under 25	12.3%	14.8%	11.7%	6.9%	7.5%	9.2%	3.7%	0.9%	35,894	15.2%
25 - 44	0.0%	43.6%	33.0%	26.7%	36.1%	40.3%	37.4%	45.9%	116,790	49.4%
45 - 54	0.0%	22.5%	11.8%	16.7%	16.5%	16.8%	21.6%	29.9%	34,278	14.5%
55 - 64	19.1%	7.3%	10.4%	15.6%	14.3%	14.8%	20.0%	15.2%	19,692	8.3%
65 and over	68.6%	11.8%	33.1%	34.2%	25.6%	19.0%	17.3%	8.0%	29,968	12.7%
									236,623	100.0%
Household Income										
LT $15,000	100.0%	100.0%	14.1%	0.0%	0.0%	0.0%	0.0%	0.0%	56,669	23.9%
$15,000 - $24,999	0.0%	0.0%	85.9%	47.4%	24.3%	0.0%	0.0%	0.0%	43,210	18.3%
$25,000 - $34,999	0.0%	0.0%	0.0%	52.6%	50.8%	35.7%	0.0%	0.0%	40,348	17.1%
$35,000 - $44,999	0.0%	0.0%	0.0%	0.0%	24.9%	46.8%	30.4%	0.0%	31,452	13.3%
$45,000 - $59,999	0.0%	0.0%	0.0%	0.0%	0.0%	17.5%	40.2%	18.0%	29,870	12.6%
$60,000 - $74,999	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	24.9%	16.2%	16,229	6.9%
$75,000 - $99,999	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.5%	27.5%	11,202	4.7%
$100,000+	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	38.3%	7,644	3.2%
									236,623	100.0%
Household Size										
1	100.0%	37.0%	81.1%	52.6%	24.9%	15.5%	9.7%	2.5%	99,110	41.9%
2	0.0%	38.9%	4.8%	39.5%	45.9%	42.4%	50.4%	23.7%	66,962	28.3%
3	0.0%	21.7%	0.0%	7.4%	11.6%	19.5%	17.1%	26.7%	31,933	13.5%
4	0.0%	2.3%	7.4%	0.3%	9.6%	13.0%	12.7%	27.6%	23,177	9.8%
5+	0.0%	0.1%	6.7%	0.2%	7.9%	9.5%	10.1%	19.6%	15,441	6.5%
									236,623	100.0%
Presence of K-12 Children										
No	100.0%	66.7%	85.9%	90.3%	72.0%	61.9%	67.4%	40.1%	164,963	69.7%
Yes	0.0%	33.3%	14.1%	9.7%	28.0%	38.1%	32.6%	59.9%	71,660	30.3%
									236,623	100%

Figure 2-3. Average Household Income by Consumption Bin, Renters and Owners

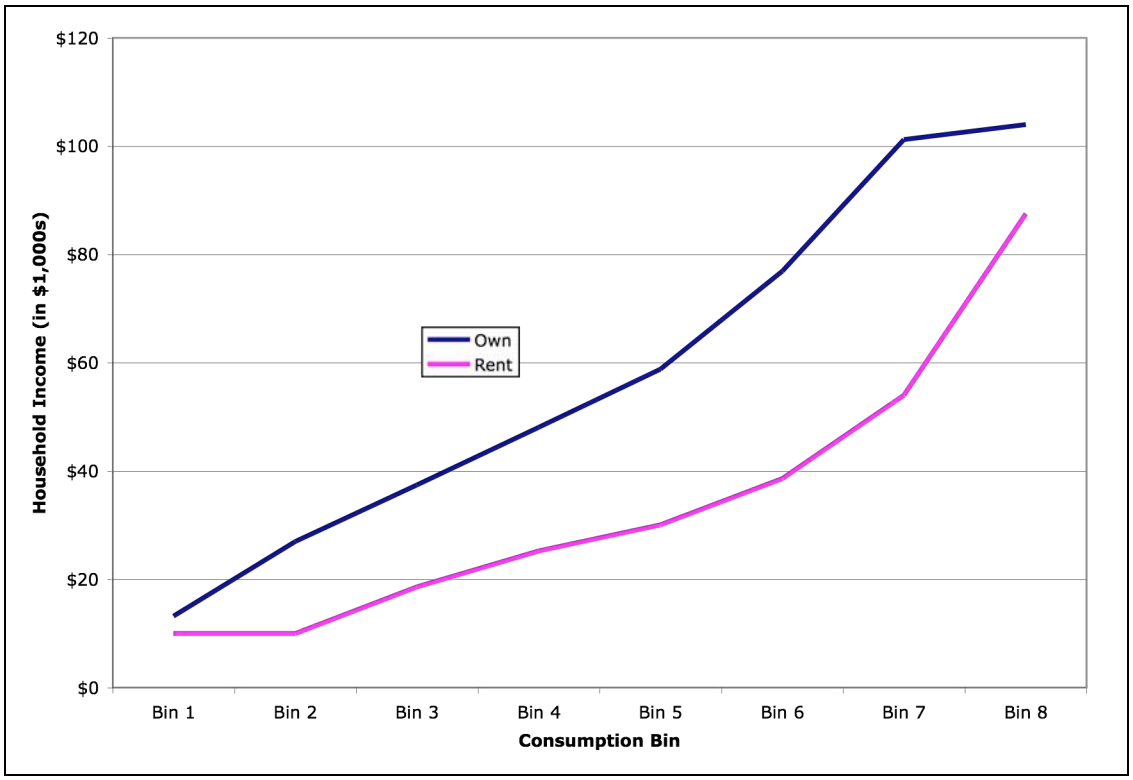


Figure 2-4. Age of Householder by Consumption Bin, Renters and Owners

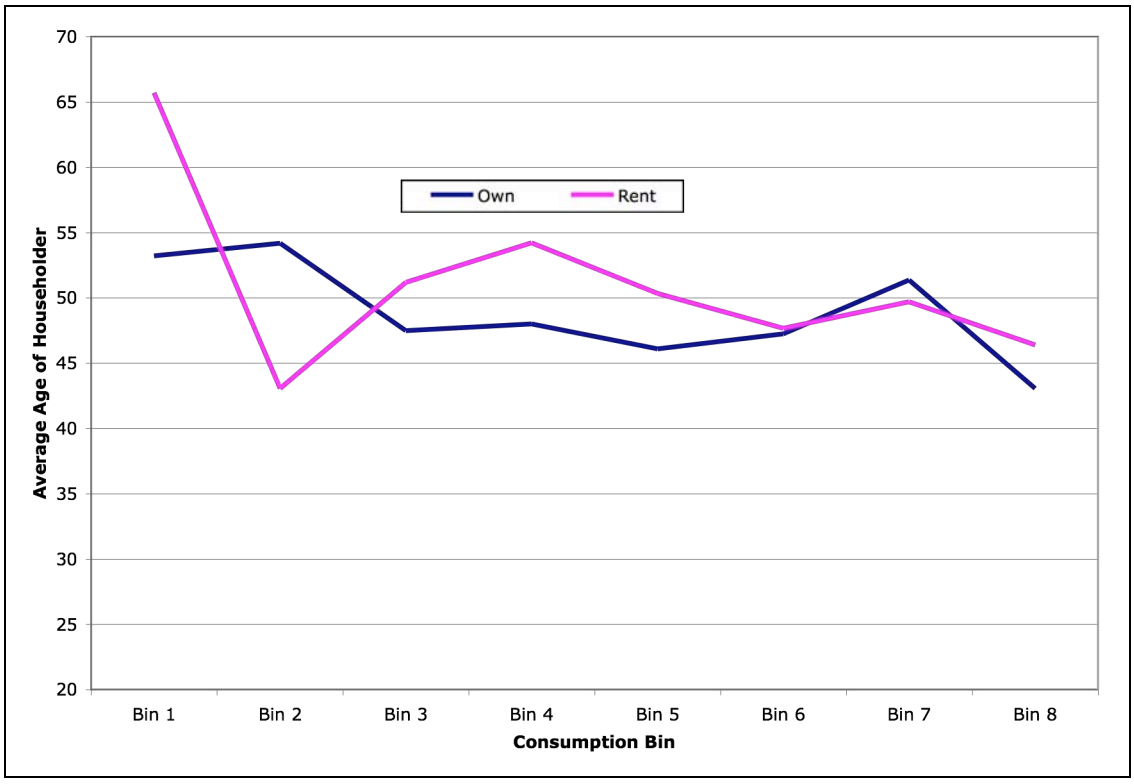
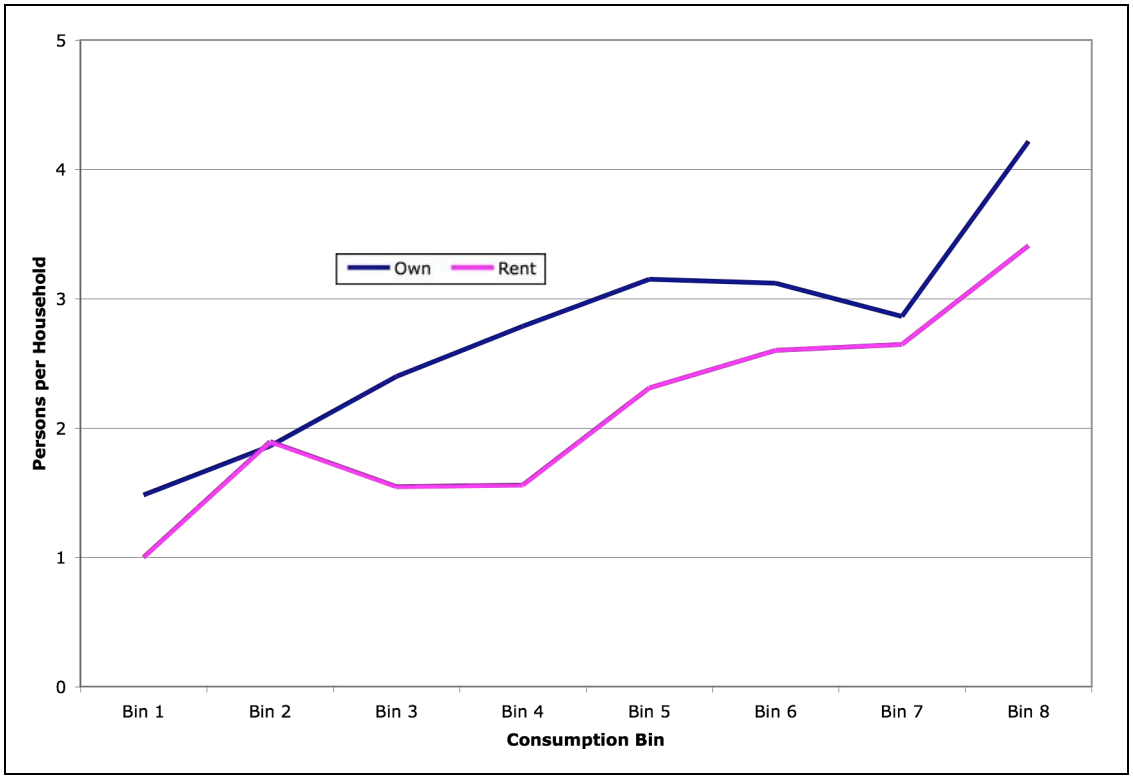


Figure 2-5. Household Size by Bin, Owners and Renters



Forecasting market results over time

The *Metroscope* model uses 2005 as the base year and produces forecasts for 2010 to 2035, in five-year increments. In the tables contained in Chapter 3, we do not always show each time period, except where this information is particularly pertinent to our findings.

Percent of income spent on housing – by type of household

The *Metroscope* model provides information regarding the percent of income spent on housing, given the household's income and the type and cost of housing chosen. Income in the *Metroscope* model is defined by the total personal income definition used by the Bureau of Economic Analysis (BEA). It includes wages & salary disbursements, dividends, interest, rent, other labor income, proprietor's income, and transfer payments less social insurance contributions. Personal income is then divided into income ranges based on sixteen Census 2000 income categories. *Metroscope* combines several of these categories and only operates with 8 income categories.

The primary weakness of this part of the analysis is the unavailability of information on wealth. No variable in the model directly measures a household's wealth. The age of household head variable picks up part of the wealth effect, resulting in higher rates of home ownership for lower income, older householders than for younger householders with the same income.

For many households, particularly older households, the wealth effect has an important impact on whether housing costs cause economic hardship. Households that have the wealth required to purchase an expensive home with a significant down payment will have a much lower mortgage payment than a household that must finance 80 percent of the cost, which is the assumption made by *Metroscope*. Thus, low-income elderly households paying a significant share of their income on housing may not be incurring hardship.

3 Findings and Analysis

In this section, we describe the *Metroscope* base case model's predictions for housing for the Oregon portion of the Portland Metropolitan region for 2005 to 2035. We examine the following questions:

- Where will household growth occur?
- What kinds of households will grow?
- What kinds of housing will these households live in?
- What percentage of their income will they pay for housing?
- What demographic groups are most cost-burdened and where do those households live?

Where will household growth occur?

Table 3-1 shows *Metroscope's* forecast for household growth from 2005 to 2035 by subarea (Subarea 17, Clark County, is included in the model but is not shown or included in the statistics). By 2035, the region (not including Clark County) will contain almost 994,000 households, a 59 percent increase in households. In 2035, these households will be distributed a bit differently than they are today, as shown in Figures 3-1 and 3-2. (Note that we use households and housing units interchangeably; in the *Metroscope* model, there is a nearly one-to-one correspondence between households and housing units.) The subareas with the greatest growth in households will be Subarea 7, the Happy Valley area, and Subarea 10, the Canby area. These areas will each grow by about 50,000 households, more than tripling their current numbers. On a percentage basis, the downtown area, Subarea 1, will also show significant growth of 188 percent.

The model predicts that about 14 percent of the region's new households will be located in the Canby area; Happy Valley will receive another 14 percent of the new households. Area 3 (northwest) will receive about ten percent of the growth in households; area 2 (north, northeast, and near east Portland) will receive about nine percent of the new households.

Table 3-1. Total Number of Households by Metro Region Subarea, 2005 and forecast to 2035[1]

	Number of Households								
Metro Region Subarea	2005	2010	2015	2020	2025	2030	2035	Growth	Pct Growth
1	8,857	11,828	16,204	20,385	22,871	24,229	25,511	16,655	188%
2	140,159	144,810	152,576	157,067	162,488	167,461	174,217	34,058	24%
3	52,977	60,433	68,230	78,948	84,867	87,069	90,918	37,941	72%
4	37,135	39,159	41,499	43,353	45,618	47,518	50,038	12,903	35%
5	47,427	51,185	55,198	58,416	63,076	69,240	77,214	29,787	63%
6	30,635	31,757	32,659	33,346	34,178	34,894	35,777	5,142	17%
7	22,122	28,002	34,107	41,488	53,740	63,955	72,052	49,930	226%
8	29,882	31,704	35,169	35,797	38,357	39,273	42,465	12,583	42%
9	13,927	15,567	18,245	20,825	22,673	27,240	30,692	16,765	120%
10	20,893	24,547	28,427	39,757	48,554	56,095	72,232	51,339	246%
11	14,549	18,195	21,988	23,133	24,398	24,966	27,834	13,286	91%
12	26,631	29,295	31,161	32,657	34,505	35,865	37,660	11,029	41%
13	42,694	46,565	49,362	52,195	54,713	56,583	58,922	16,228	38%
14	62,185	68,062	72,402	76,720	82,245	86,797	91,438	29,253	47%
15	23,183	26,207	28,622	30,072	31,688	32,842	34,088	10,905	47%
16	10,773	11,633	12,668	13,590	14,904	16,312	17,467	6,694	62%
17									
18	11,184	15,287	16,112	16,242	16,798	16,956	18,461	7,277	65%
19	27,064	27,874	28,617	29,408	30,413	31,856	34,182	7,118	26%
20	2,472	2,498	2,531	2,542	2,588	2,590	2,718	247	10%
Total	624,749	684,609	745,778	805,941	868,673	921,742	993,887	369,138	59%

1. Table does not include Subarea 17, Clark County

Figure 3-1. Households by Metro Region Subarea, 2005

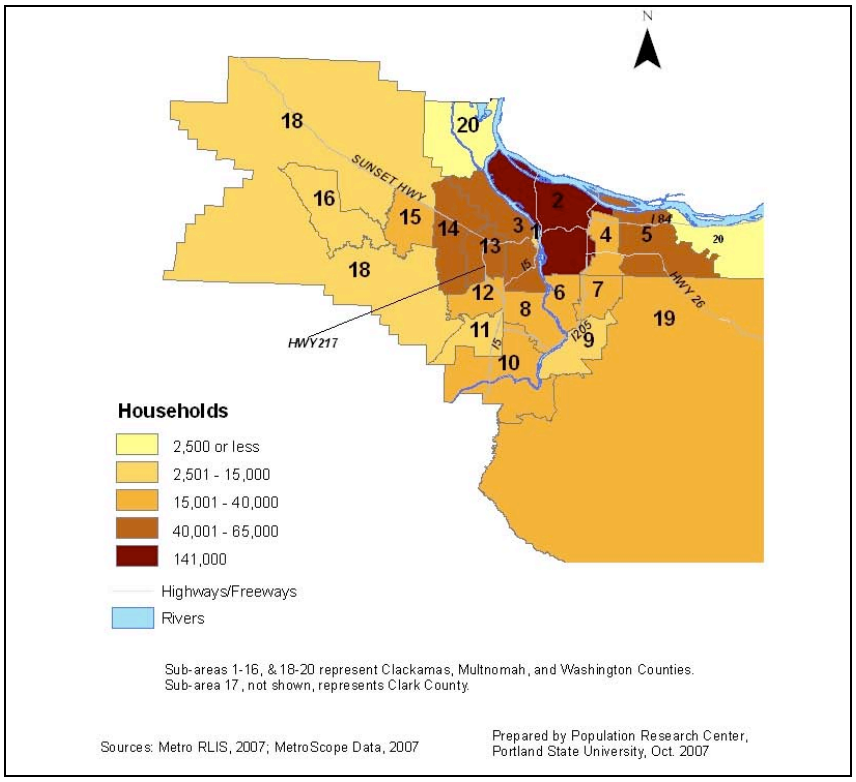
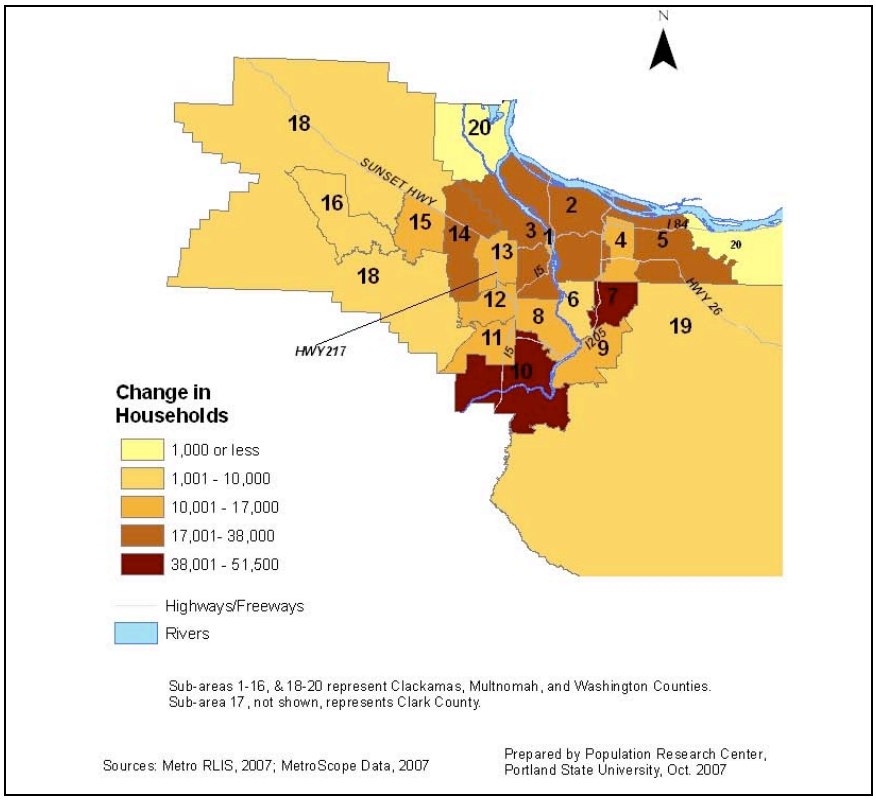


Figure 3-2. Change in Households by Metro Region Subarea, 2005-2035



What kinds of households will grow?

Households by Age

Figure 3-3 shows the distribution of the region's households by age of the householder. By 2035, the percentage of householders age 65 or over will grow from about 18 percent to about 27 percent, while the percentage of householders in each of the other age groups declines. This reflects the aging of the baby boom and the relatively smaller size of the age groups behind it.

Households by Income

Figure 3-4 shows the distribution of households by income for 2005 and 2035. It shows that the lowest income group, households with income less than $15,000, currently comprises about 11.3 percent of total households; this will rise to 13.5 percent by 2035. Similarly, the percentage of households in the following three income groups will rise from 2005 to 2035. But the share of households in the next three groups ($45,000 to $59,999; $60,000 to $74,999; and $75,000 to $99,999) will fall. The highest income category, households earning greater $100,000 or more, will rise from 14.7 percent of the population to 16.4 percent.

Household size

Household size is fairly stable over time, as shown in Figure 3-5; it has trended downward in the past and has now bottomed out. Nevertheless, the percentage of households with two people drops from 32 percent to 30 percent by 2035 as the aging population experiences empty children leaving the household or the death of a spouse. The percentage of households with children present is also fairly steady at just over 35 percent.

Figure 3-3. Household Age Distribution 2005-2035: Total Households

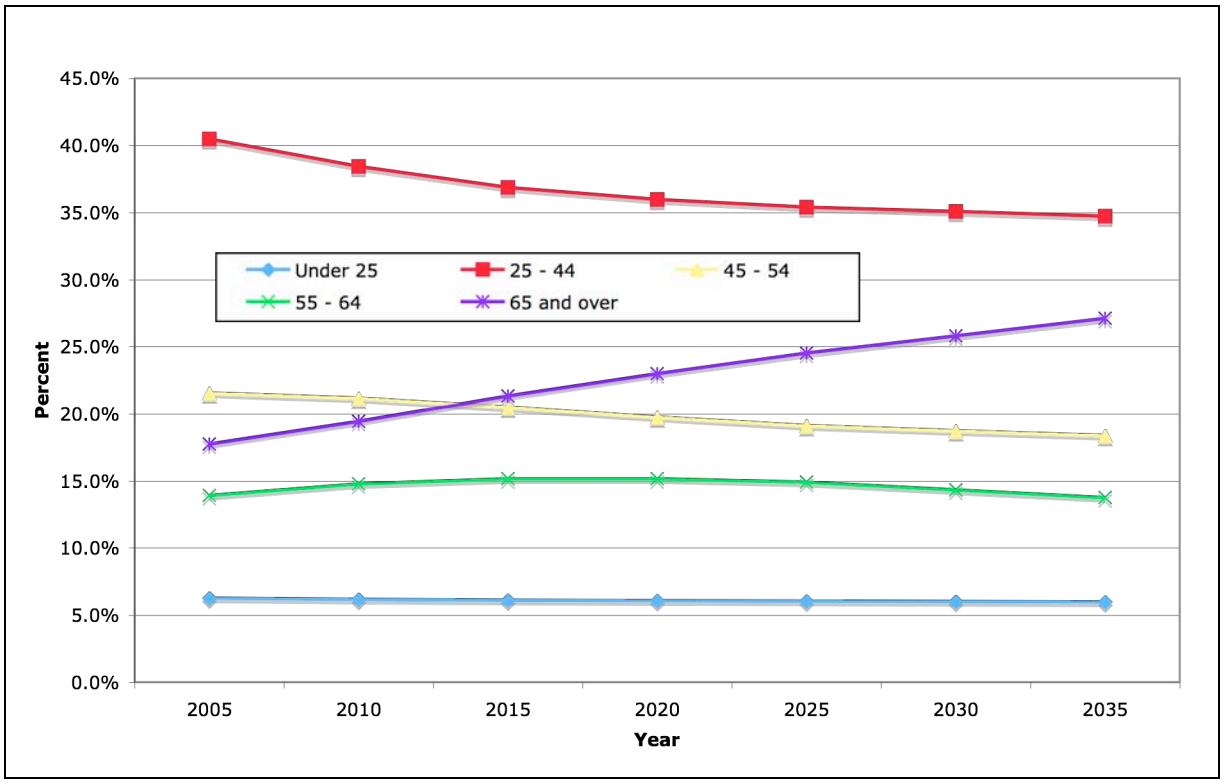


Figure 3-4. Household Income Distribution 2005 and 2035: Total Households

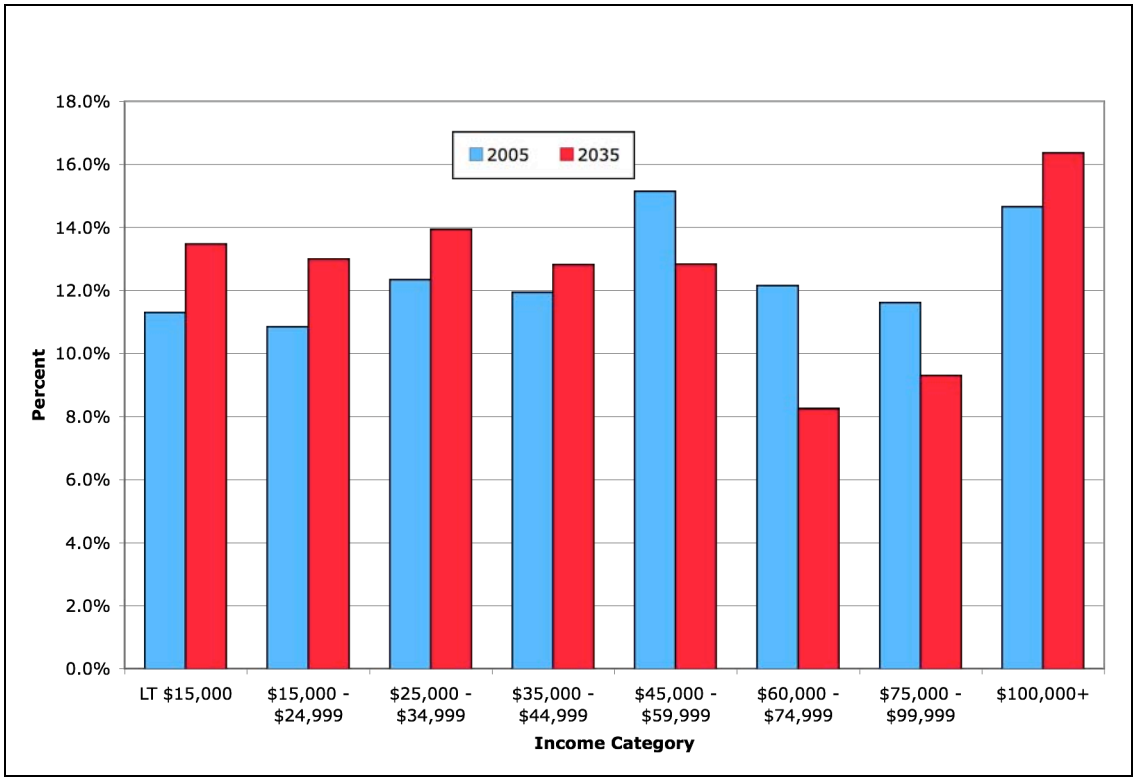
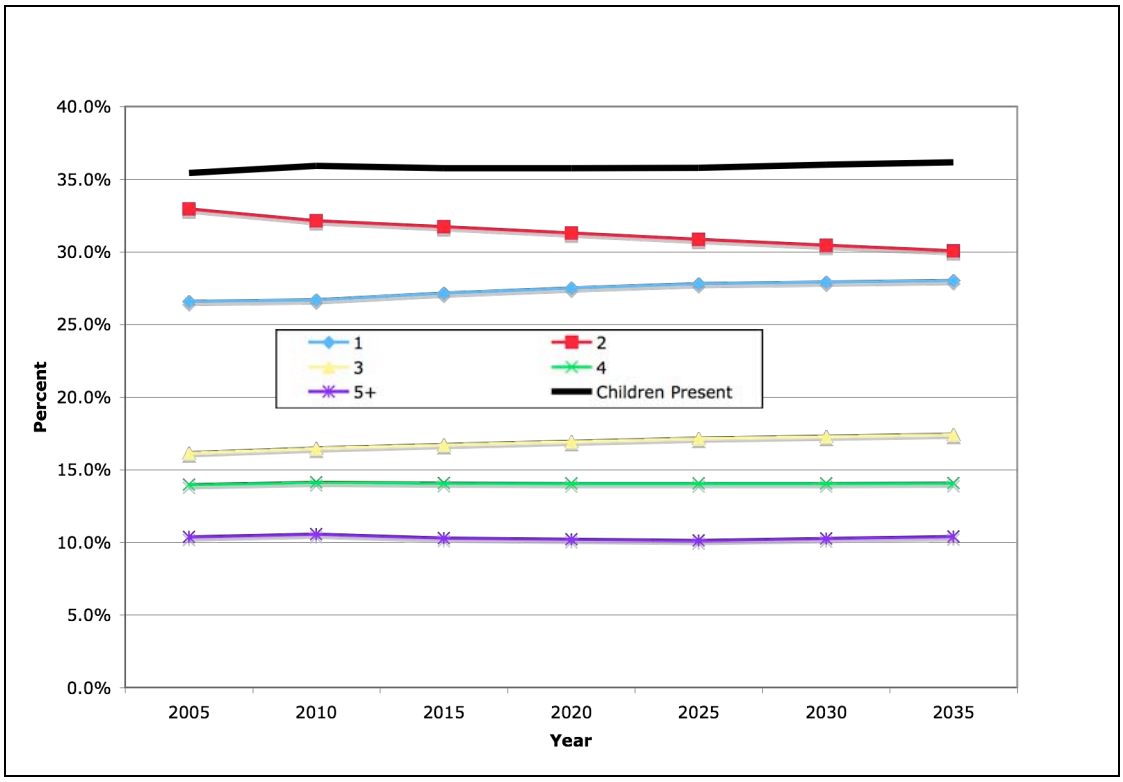


Figure 3-5. Household Size Distribution 2005 to 2035: Total Households



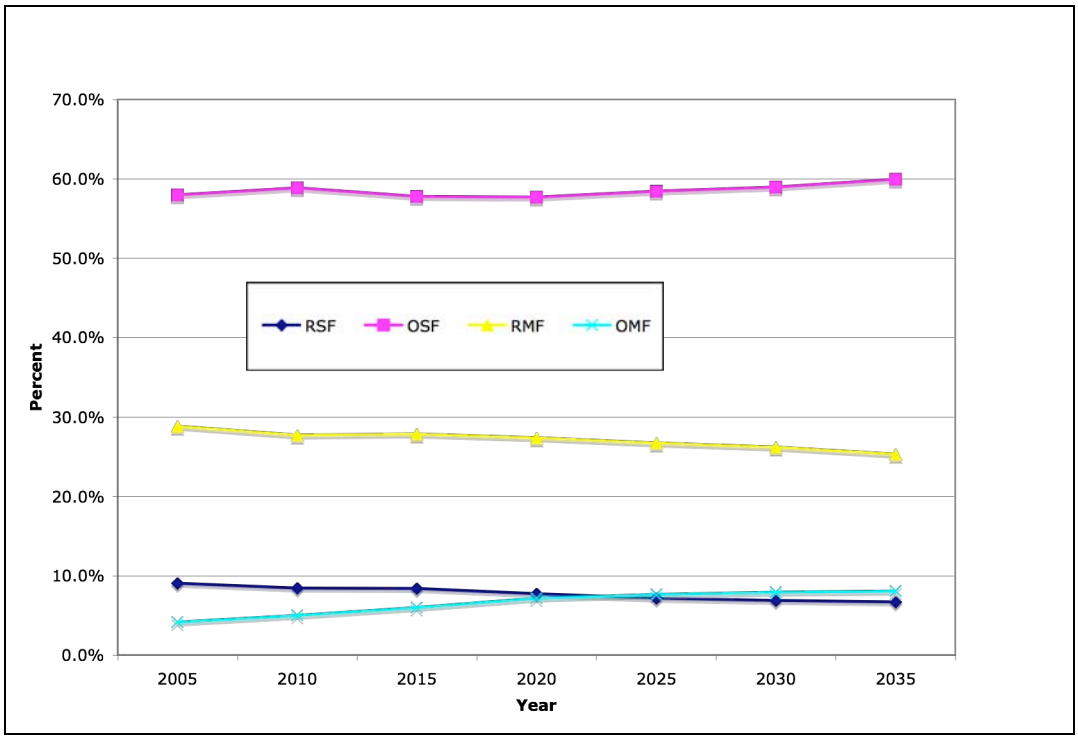
What kind of housing will they live in?

Table 3-2 shows the number of households by tenure and housing type, region-wide from 2005 to 2035. As a percentage of total households, the share for most housing types does not change much over this period. However, the owner-occupied multifamily units double both in raw numbers and in terms of their share of total units, rising from 4 percent of total households in 2005 to 8 percent in 2035. While this is a large percentage change, the total change, 53,901, is only about 15 percent of the total growth in households; the growth in owner single-family housing far outweighs this increase. Rental housing's share of total households declines by 5.9 percent as a greater share of renters become owners. Among the new units added, only 22 percent are rentals. This change in shares is illustrated in Figure 3-6.

Table 3-2: Households by Tenure/Housing type, Region wide, 2005 to 2035

Tenure/Type	2005	2010	2015	2020	2025	2030	2035	Change 2005-2035	Pct Change
Rental Single Family	56,453	57,734	62,678	62,354	62,398	63,629	66,400	9,948	17.6%
Owner Single-Family	362,098	402,944	430,846	465,182	507,829	543,564	595,823	233,725	64.5%
Rental Multifamily	180,170	189,817	207,731	220,799	232,044	241,755	251,734	71,565	39.7%
Owner Multifamily	26,028	34,114	44,523	57,607	66,402	72,794	79,929	53,901	207.1%
Total	624,749	684,609	745,778	805,941	868,673	921,742	993,887	369,138	59.1%
Pct Renters	37.9%	36.2%	36.3%	35.1%	33.9%	33.1%	32.0%	-5.9%	
Pct Owners	62.1%	63.8%	63.7%	64.9%	66.1%	66.9%	68.0%	+5.9%	

Figure 3-6. Percent of Households by Housing Type



Life-Cycle and the Demographics of Housing

The current analysis will focus on a life-cycle or life-stage approach to housing choice. The basic model is as follows: young householders begin their independent living as apartment renters; these young renters age into renting single-family houses, or purchasing starter homes; as age, family size, and income increase, these owners upgrade their housing conditions; finally, in the latter years, these householders have either aged-in-place, or transitioned to owning condominiums or renting apartments.

To accommodate this life-cycle model, the following analysis will differ from that provided in the previous section. This section will focus on housing choice as a joint decision between tenure (own, rent) and structure type (single- or multi-family). For each housing type, we examine demographic characteristics based on the shares represented by each of these four housing options. That is, for any given demographic group, the sum over the four housing choices will sum to one hundred percent.

Demographics of Rental Multifamily Units

We begin our discussion of the demographics of each housing type with the type of housing people typically move into when they are young and first independent: rental multifamily housing. Figure 3-7 shows the shares for rental multifamily units by age of householders. As we would expect, householders under age 25 occupy this housing type with most frequency; 60 percent of these youngest households rent multifamily units. The second most likely to occupy this housing type are the 24-44 year olds, followed by the elderly. These patterns of age and housing type are very stable over time.

Figure 3-7. Shares of Age of Householder 2005-2035: Rental Multifamily Units

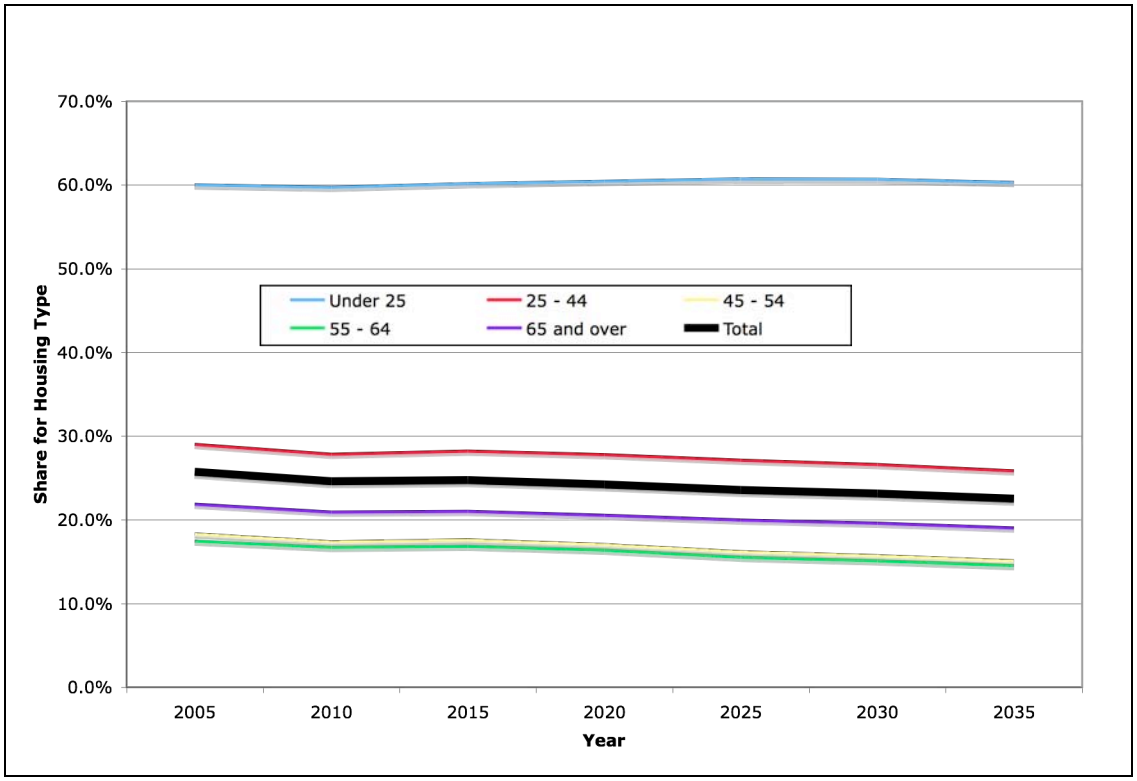


Figure 3-8 shows that the lowest income group is the most likely to choose this housing type, and that the share of the population renting multifamily units falls as income rises. While about 57 percent of the lowest income households chose this housing type in 2005, only about 5 percent of the highest income households did so. These relative shares are stable over time.

Just as young and low-income households are most likely to choose this housing type, so are single-person households. Figure 3-9 shows that about 49 percent of all single-person households choose rental multifamily housing. While this percentage will fall by 2035, these households will still be by far the most likely to choose this housing type. The largest households are least likely to choose this housing type.

The overall decline in the percentage of households choosing this housing type reflects the overall decrease in rental housing shown in Table 3-2.

Figure 3-8. Shares by Income Groups 2005-2035: Renter Multifamily Units

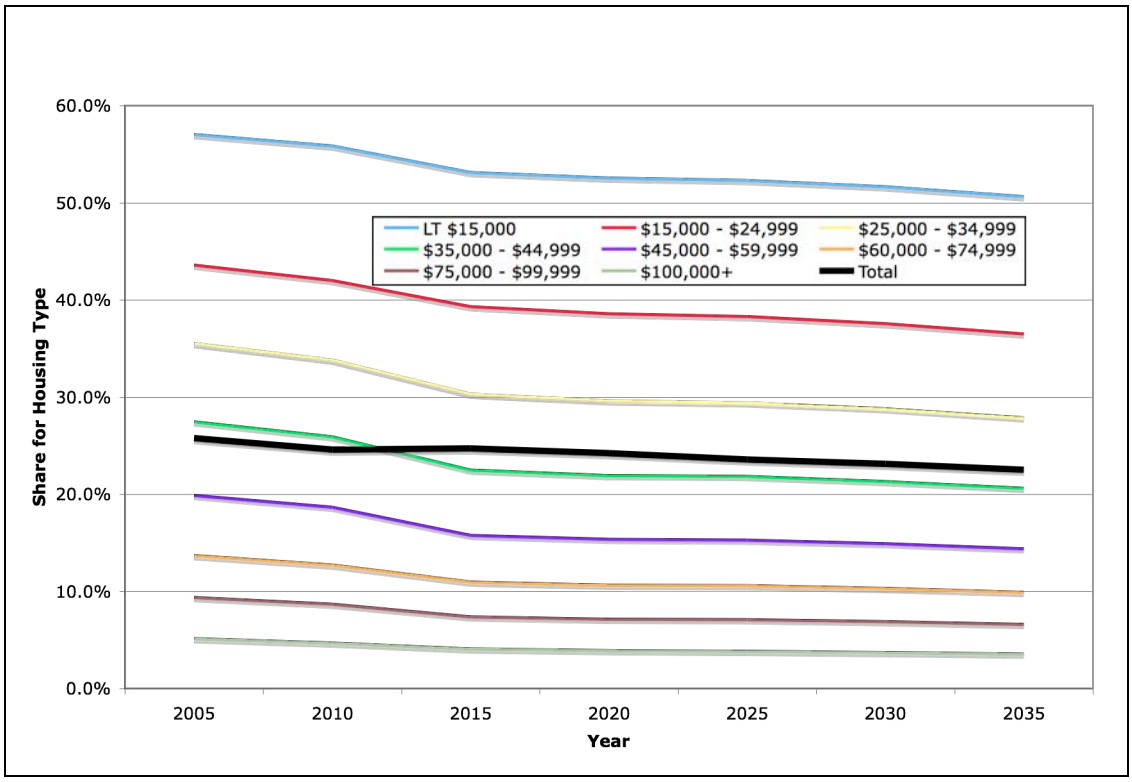
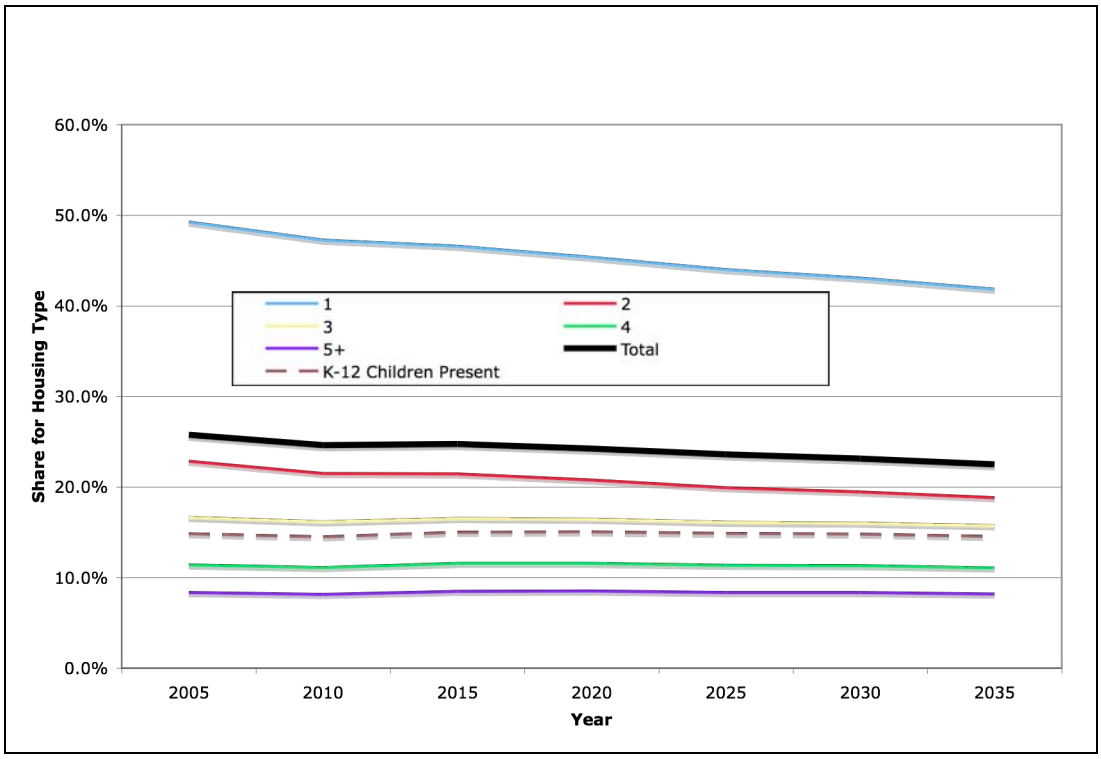


Figure 3-9. Shares by Household Size and Presence of Children 2005-2035: Rental Multifamily



Demographics of Rental Single-Family Units

For much of the 20th century, zoning in the Portland metropolitan area has mandated the development of large amounts of single-family housing and limited the development of rowhouse, townhouse, and apartment development that normally provides rental housing opportunities. And since the demand for rental units remained high, the Portland region has traditionally had significant amounts of its single family housing stock occupied by renters. In 2002, for example, the Portland OR-WA PMSA had 23.8% of its housing units in multi-family housing while 30.8% of its single-family housing stock as rental housing (Statistical Abstract of the United States, 2004-05, Table 946). Assuming a reasonable number of condominium-type complexes, which combine multi-family housing and ownership, this implies a significant share of rented single-family housing.

In more recent years, zoning and land use changes, typified by Metro's Metropolitan Housing Rule, have promoted higher density development and multi-family housing. Restrictions on the development of apartments and rowhouses have been lifted and cities have been required to allocate some of their jurisdiction for apartment construction.

This easing of the regulatory burden has been matched by changing economic pressures. As land prices in the region have risen significantly, higher-density, multi-family housing has become more economical for developers than building lower-density, single family housing. As a result, the percentage of single family housing in the region is expected to decline.

The declining amount of single-family housing in the region is likely to be occupied in greater numbers by owner-occupants. On the supply side, managing a dispersed collection of single-family homes is more expensive than managing a single apartment building. And on the demand side, because renter households have less income than owner households on average, they are more able to afford the smaller square footage that is typical in an apartment than a single-family house. For both of these reasons, the percentage of single-family rental stock is projected to decline.

As a result, in Figure 3-10, we find that the percentage of renter single-family units declining for all household age groups between 2005 and 2035. Householders under 25 most frequently choose this housing type. Younger households are more likely to choose rental housing. Their lower average incomes make the tax deduction of home ownership less attractive. Moreover, their greater likelihood of moving makes the transaction costs of buying and selling a home more of a deterrent.

As shown in Figure 3-11, income also correlates negatively with the shares for these housing units. The wealthiest are the least likely to rent these units, as their higher marginal tax rates promote the choice of homeownership. Figure 3-12 shows that about among households with children, 16 percent choose this housing type, considerably higher than non-family households. Families are more likely to live in single-family rental housing than non-families due to their needs for greater space for their children. However that percentage will fall over time, reflecting the overall decline in the availability of these units. The uniform decline in rental, single-family housing across the household size categories in 2005-2035 reflects the overall loss of rental single-family housing.

Figure 3-10. Shares by Age of Householder 2005-2035: Renter Single-Family Units

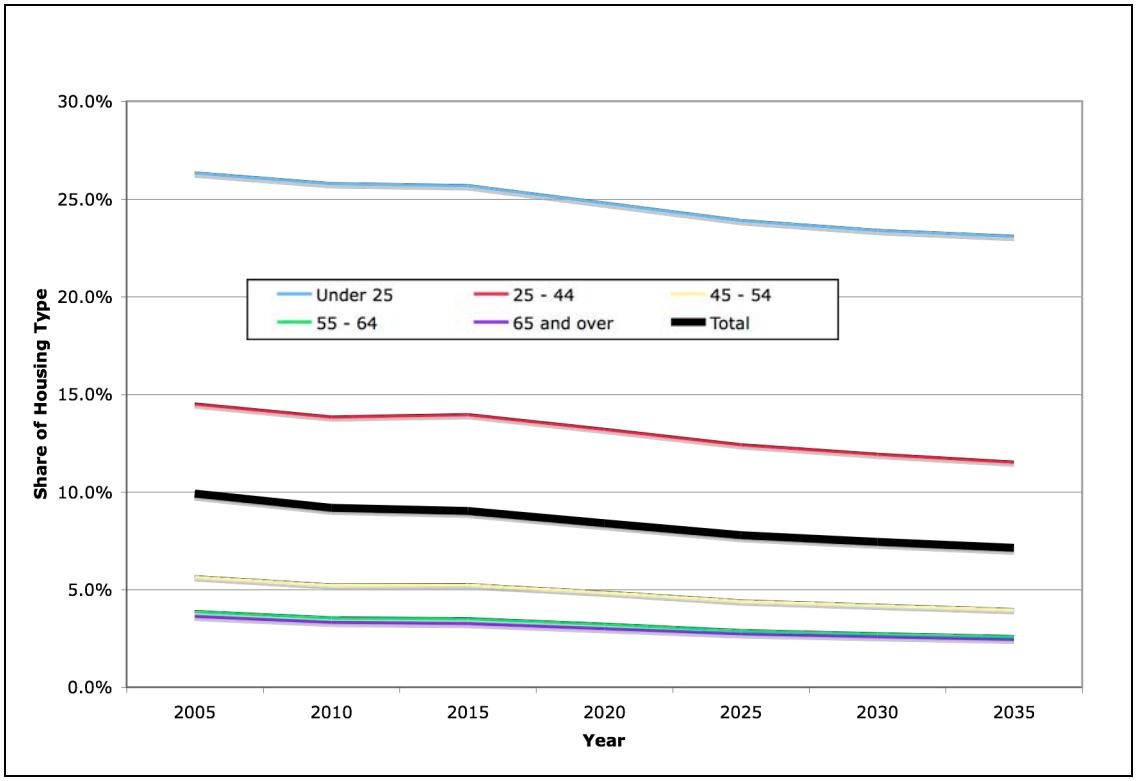


Figure 3-11. Shares by Income Groups, 2005-2035: Rental Single-Family Units

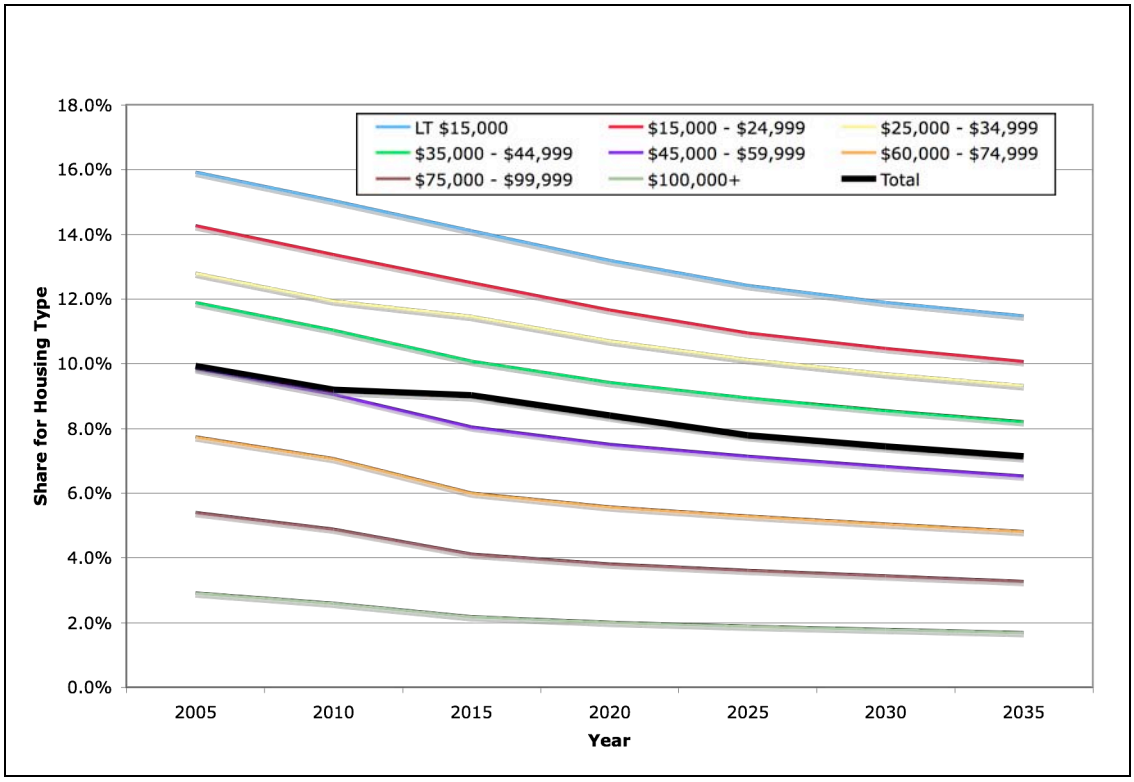
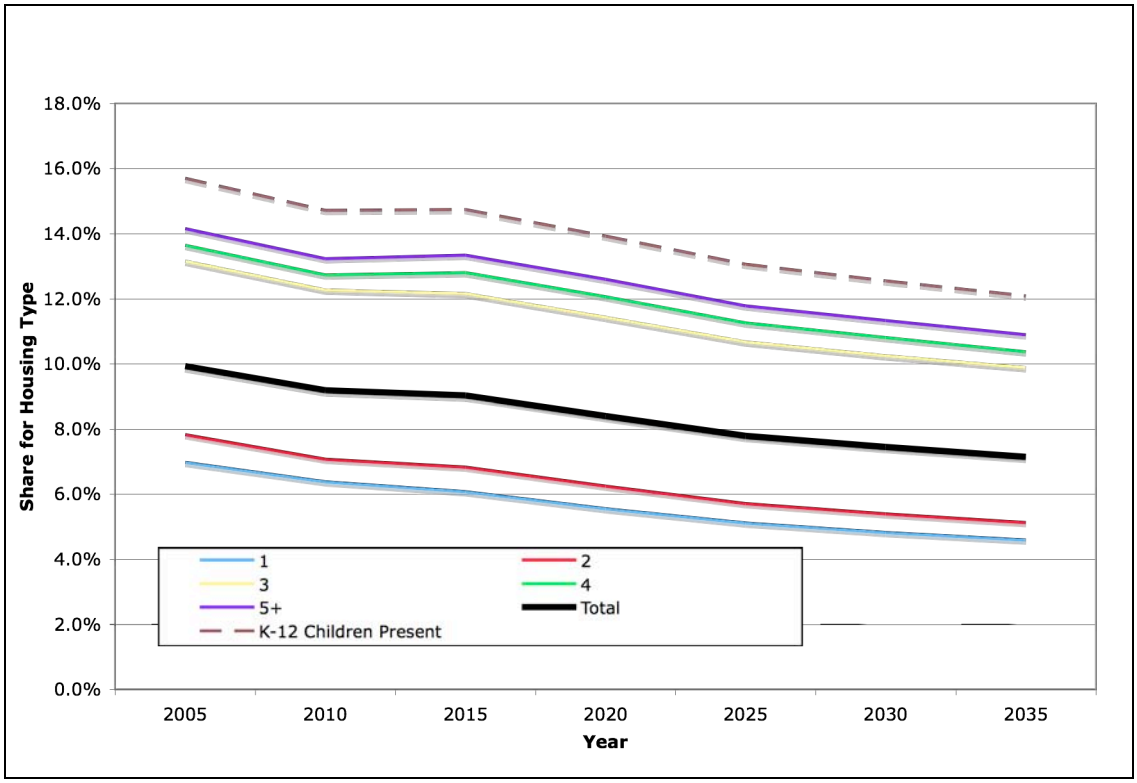


Figure 3-12. Shares by Household Size and Presence of Children, 2005-2035: Rental Single-Family Units



Demographics of Owner Single-Family Units

Older, higher-income households with children are most likely to own single-family units. Figure 3-13 shows the breakout by age. Only about 13 percent of householders under 25 own a single-family unit, and this percentage changes very little over time. All households over the age of 45 are more likely than the total population to choose single-family homes. In 2005, about 70 percent of the elderly chose a single-family home. This percentage will fall only slightly by 2035, to about 68 percent.

Figure 3-14 shows that income once again drives housing choice as the highest income households overwhelmingly choose to own single-family units. About 90 percent of the highest-income households choose single-family units and this remains essentially unchanged by 2035, falling by less than one percentage point. In 2005, only about 25 percent of the lowest income households choose a single-family home in 2005. This will rise to 32 percent by 2035.

Figure 3-15 shows that while a significant share (40 percent) of single-person households live in these units, larger households and households with children are most likely to choose this housing type. The shares for two-person households occupying these units jumps to 66 percent and the share for five or more persons is about 80 percent of these households. In addition, these larger household sizes are augmented by the presence of children, representing 70 percent of all housing units with children.

Figure 3-13. Shares by Age of Householder 2005-2035: Owner Single-Family Units

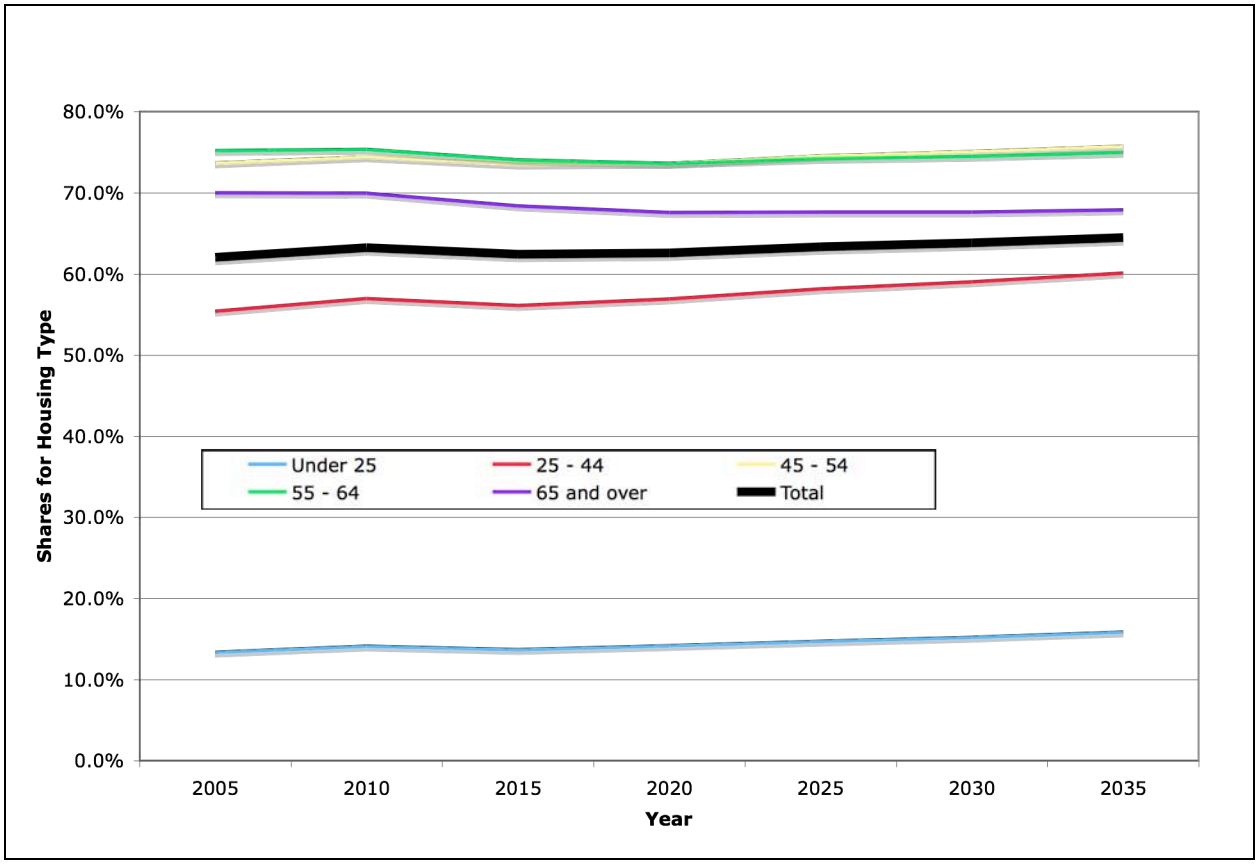


Figure 3-14. Shares by Income Groups 2005-2035: Owner Single-Family Units

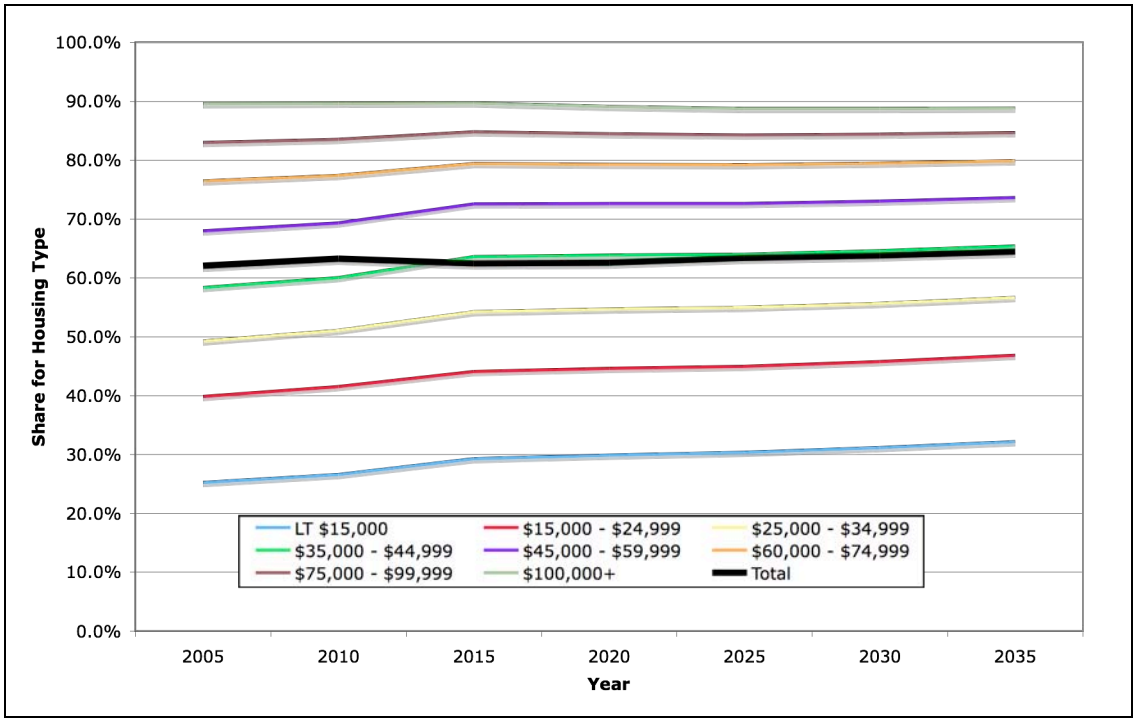
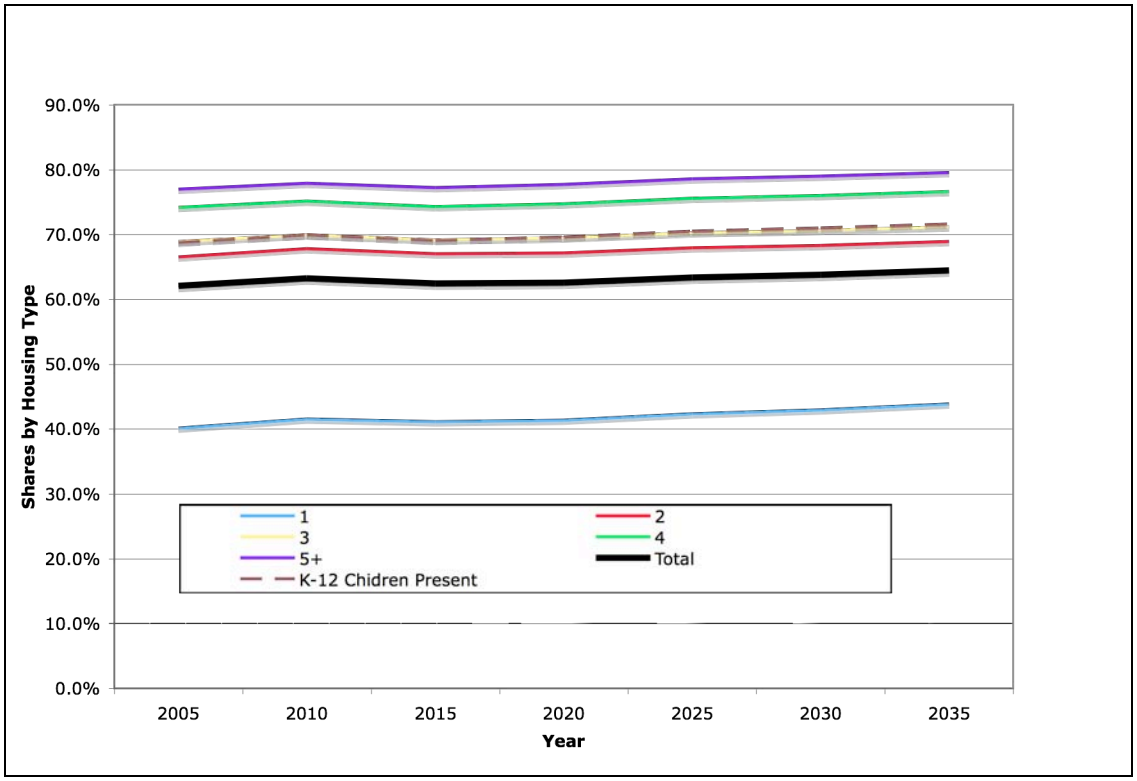


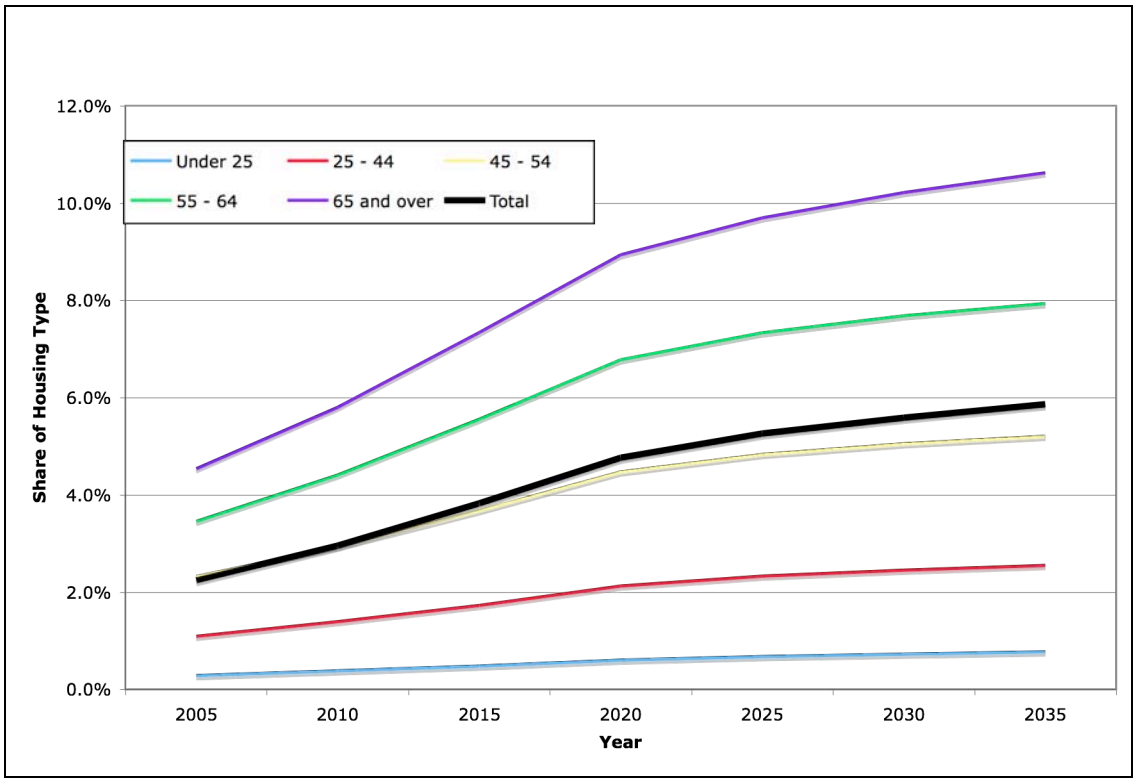
Figure 3-15. Shares by Household Size and Presence of Children, 2005-2035: Owner Single-Family Units



Demographics of Owner Multi-family Units

Our final housing type, owner multi-family units, is much more interesting because shares rise over time for all age groups, all income ranges, and all family sizes, reflecting the overall rise in shares for this housing type. But as shown in Figure 3-16, this housing type is dominated by the retired and those nearing retirement. Householders aged 65 and over are twice as likely to purchase this housing product as the overall population. By 2035, over 10 percent of those over 65 will live in multi-family owner-occupied housing. Similar growth will occur in the 55-64 year age group. In addition, householders 65 and over will represent almost 50 percent of these units.

Figure 3-16. Shares by Age of Householder 2005-2035: Owner Multifamily Units



Income does not appear to drive the choice of owner-occupied multifamily housing. Figure 3-17 shows that there is very little difference between income groups with respect to the probability of living in an owner-occupied multifamily housing unit. We expect that this is because the retired and near-retired bring assets from the sales of previous homes to their purchase of a multifamily unit. Thus, although their income may be low, they are still able to afford this housing product.

According to the 2002 American Housing Survey, about 29 percent of owner-occupied units in the Portland Metropolitan area were owned free and clear, with no mortgage. Among homeowners 65 and older, 71 percent owned their homes free and clear; among homeowners with incomes below the federal poverty level, 59 percent owned their homes free and clear (U.S. Census Bureau, 2002). This provides a strong indication that many individuals use assets to purchase homes, and that, especially among the elderly, income does not necessarily determine who can afford a home.

Figure 3-17. Shares by Income Groups 2005-2035: Owner Multi-Family Units

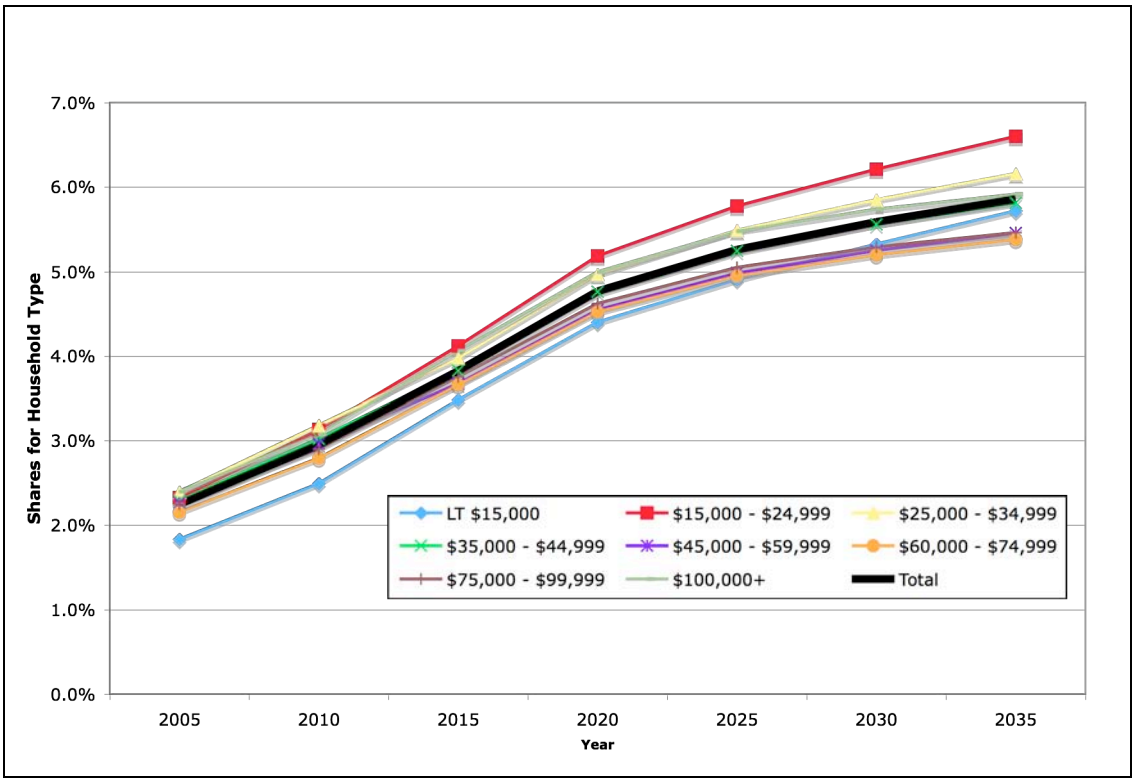
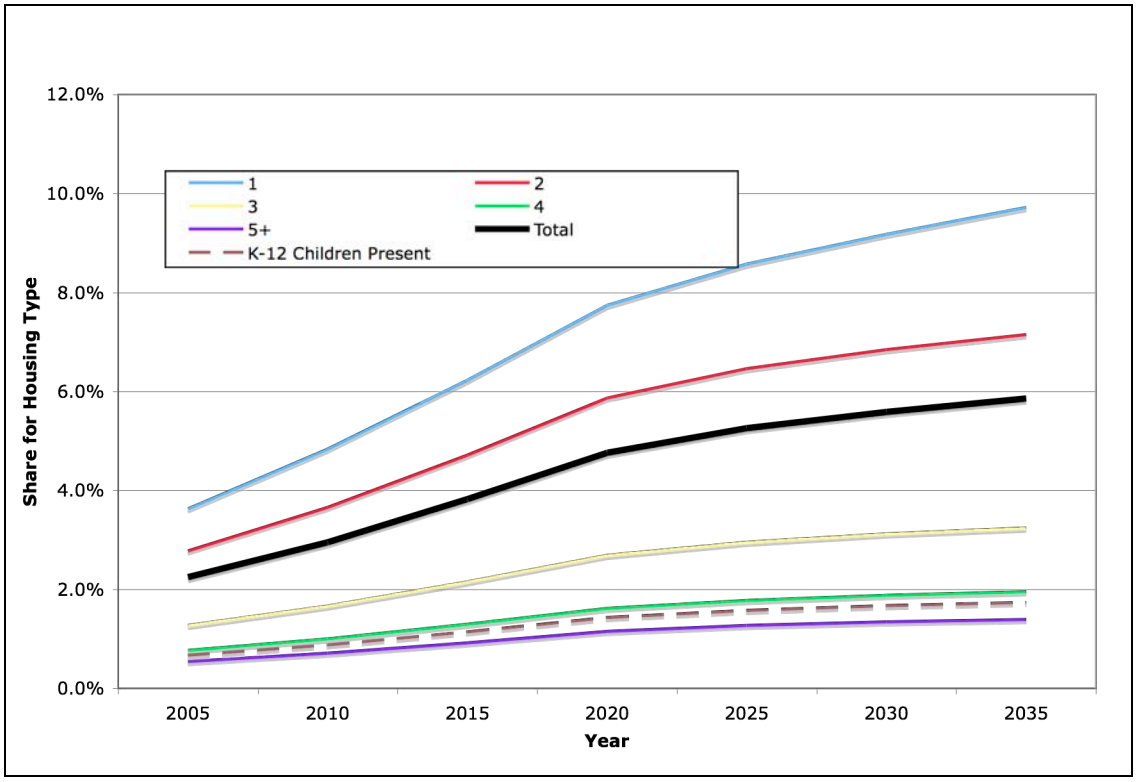


Figure 3-18 shows that most of those who currently live and will live in these units are single-person households and two-person households without children. Although the percentage of households with children in this housing segment will rise between 2005 and 2035, it will still comprise less than two percent of households with children.

Figure 3-18. Shares by Household Size and Presence of Children, 2005-2035: Owner Multifamily Units



What percentage of their income will they pay for housing?

As explained in Section 2, income in the *Metroscope* model is defined by the total personal income definition used by the Bureau of Economic Analysis (BEA). It includes wages & salary disbursements, dividends, interest, rent, other labor income, proprietor's income, and transfer payments less social insurance contributions. Personal income is then divided into sixteen income ranges based on Census 2000. *Metroscope* combines several of these categories and only operates with eight income categories.

Housing costs in the model include rent or mortgage payment (assuming a 20 percent down payment), utilities, property taxes, household operations, and housekeeping supplies. As discussed earlier, the *Metroscope* model does not include data on household wealth, the largest component of which is home equity. Since home equity doesn't create an income flow, these households appear to be poorer than they really are. Or from another perspective, having more home equity means lower mortgage payments than those estimated by *Metroscope*. As a result, some owner households that appear to be cost-burdened may instead have chosen to allocate a significant portion of their wealth to home ownership.

Noting this limitation, *Metroscope* finds that 43 percent of the region's renter and owner households in 2005 pay 30 percent or more of their income for housing. The model predicts that this percentage will rise to almost 50 percent by 2035. This trend is shown in Figure 3-19, along with the percentage of households that will pay 40, 50, and 60 percent of their income for housing. These are also trending upwards.

Figure 3-19. Percent of Income Spent on Housing 2005-2035: Total Households—Rental and Owner Housing

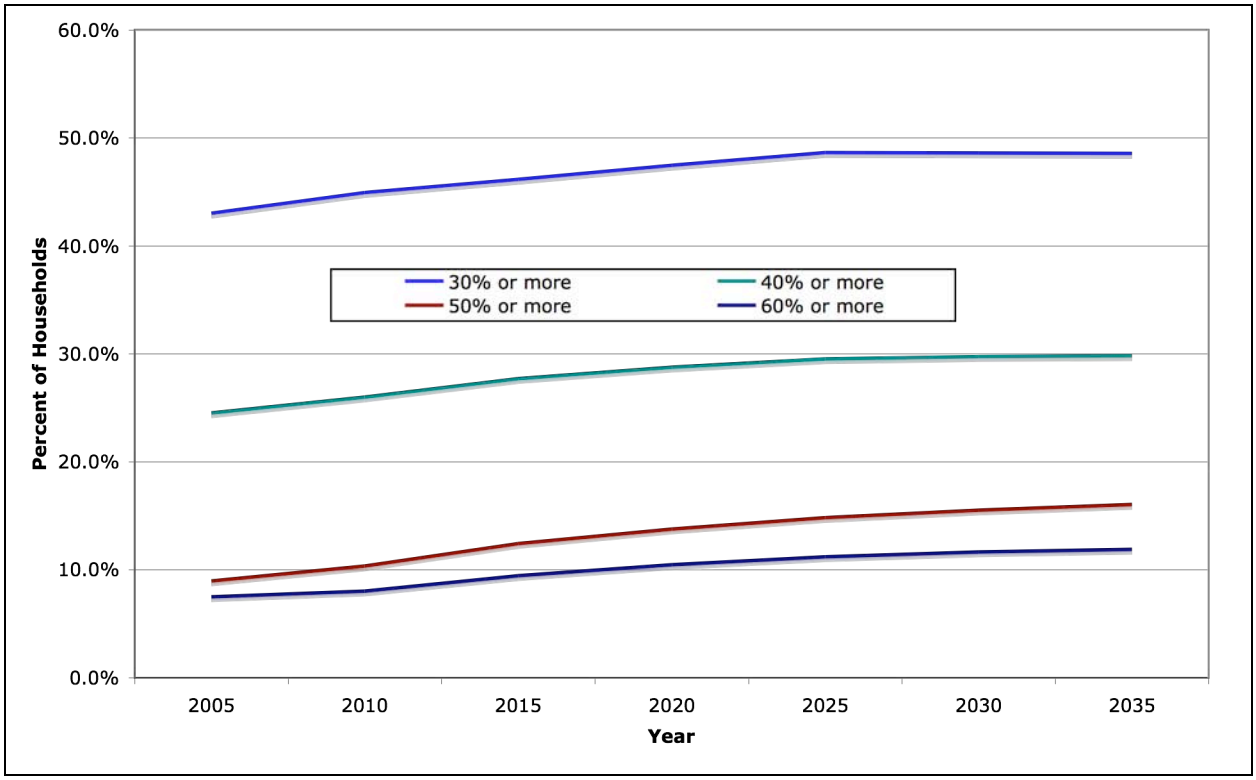
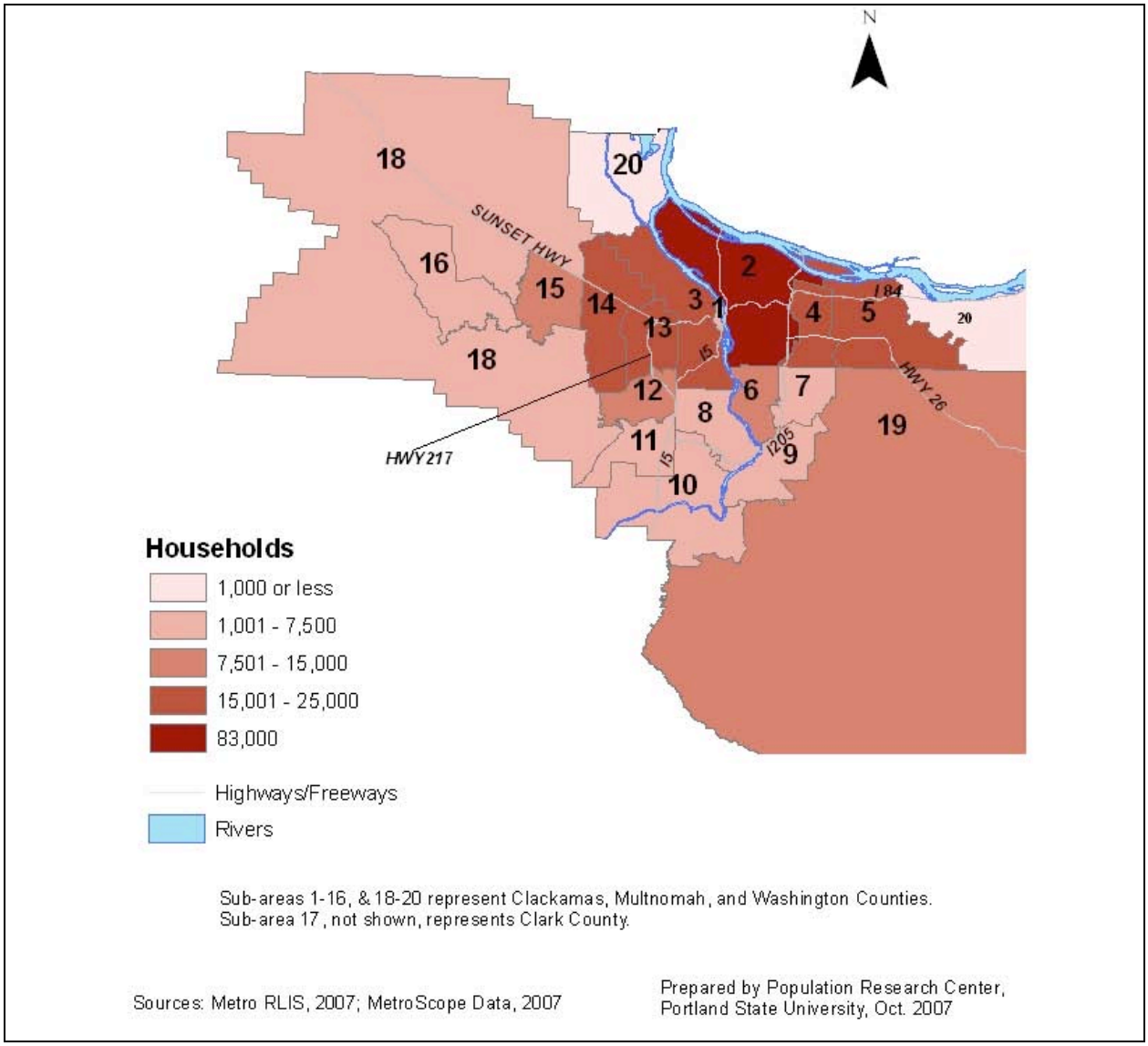


Figure 3-20 and Table 3-3 show the distribution across the region of households spending 30 percent or more of their income on housing in 2005. The largest number of cost-burdened households is in Subarea 2—north and east Portland—where 58 percent of the subarea's households pay more than 30 percent of their income for housing. By comparing each subarea's share of total households with its share of cost-burdened households, we see that some subareas have a greater share of these households than others. In 2005, Subarea 2 had 22.4 percent of the region's total units, but 30.6 percent of the cost burdened units. Subareas 1, 2, 4, 5, 6, and 16 all had a percentage of cost-burdened households larger than their share of total households.

Some of the high housing costs in Subarea 2 may be explained by the relatively low transportation costs experienced by living in such a central location. That is, a person living in north and east Portland is likely to find more frequent transit service and be able to reduce the expenses of car ownership. Unfortunately, *Metroscope* does not include data on transportation costs by households.

Evidence to support this argument shows up in national data from the US Bureau of Labor Statistic's Consumer Expenditure Survey. The poorest 20 percent of US households spent 39.4 percent of their expenditures on housing and 14.3 percent of their expenditures on transportation. In looking at progressively higher income household quintiles, the percentage of expenditures spent on housing falls to 35.2 percent, 33.9 percent, 31.0 percent, and 30.9 percent. At the same time, the percentage of expenditures on transportation rises to 18.4 percent, 19.0 percent, and 19.3 percent before falling to 17.3 percent for richest 20 percent of households. Consequently, the percentage of household expenditures spent on housing and transportation is more or less constant for household in lower 60 percent of income categories. Only at the highest income levels does this percentage drop.

Figure 3-20. Households Paying More than 30 percent of Income for Housing Costs by Metro Subarea, 2005



The result described above can also be demonstrated by looking at city residents versus suburbanites. The Consumer Expenditure Survey finds that while central city residents pay a greater percentage of their expenditures for housing, 34.1 percent vs. 32.6 percent, they spend less on transportation costs, 16.6 percent vs. 18.2 percent. The net percentage spent on housing and transportation is essentially the same. This result is largely driven by car ownership. The typical city household owns 1.5 cars and the typical suburban household owns 2.1 cars.

However, this analysis does not take into account the burden placed by greater commuting time. Transit commuting trips often take much longer, over 63% longer for Multnomah County commuters. The dollars saved from less car ownership may come at the expense of greater travel time. Hence, a more complete analysis of housing cost burdens might also account for the value of time.

Table 3-3. Cost Burdened Households by Metro Region Subarea, 2005: Renters and Owners

Subarea	Pct Households paying 30 % or more for Housing Costs	Subarea's Share of Total Region's Households	Subarea's Share of Total Region's Cost Burdened Households (30%)	Subarea's Median Household Income (Constant $)
1	61.7%	1.4%	2.0%	$20,860
2	58.8%	22.4%	30.6%	$36,720
3	41.1%	8.5%	8.1%	$61,950
4	54.9%	5.9%	7.6%	$37,370
5	46.3%	7.6%	8.2%	$42,720
6	47.3%	4.9%	5.4%	$43,080
7	26.6%	3.5%	2.2%	$64,970
8	24.9%	4.8%	2.8%	$87,560
9	37.6%	2.2%	1.9%	$50,770
10	24.2%	3.3%	1.9%	$72,780
11	28.0%	2.3%	1.5%	$59,240
12	35.1%	4.3%	3.5%	$54,270
13	38.1%	6.8%	6.1%	$48,590
14	32.0%	10.0%	7.4%	$56,290
15	41.0%	3.7%	3.5%	$49,090
16	55.0%	1.7%	2.2%	$38,930
18	32.0%	1.8%	1.3%	$71,540
19	34.2%	4.3%	3.4%	$63,490
20	31.8%	0.4%	0.3%	$76,180
3-County Area	43.0%	100.0%	100.0%	$48,990

Figure 3-21 shows the change in the number of cost-burdened households from 2005 to 2035 and Table 3-4 shows cost burdened households by subarea for 2035. The number of cost-burdened households rises everywhere and the rise is more or less uniform across the region. The largest increases occur in the places at the center of the region—east and west Portland. The only subareas in which the percentage of cost-burdened households falls are Subareas 8 and 10, which roughly corresponds to the cities of West Linn, Lake Oswego, and Wilsonville. In 2035, Subareas 1 through 6, 12, 15, and 16 will have a percentage of cost-burdened households larger than their share of total households.

Figure 3-21. Change in Households paying more than 30 Percent of Income for Housing Costs by Metro Subarea, 2005-2035

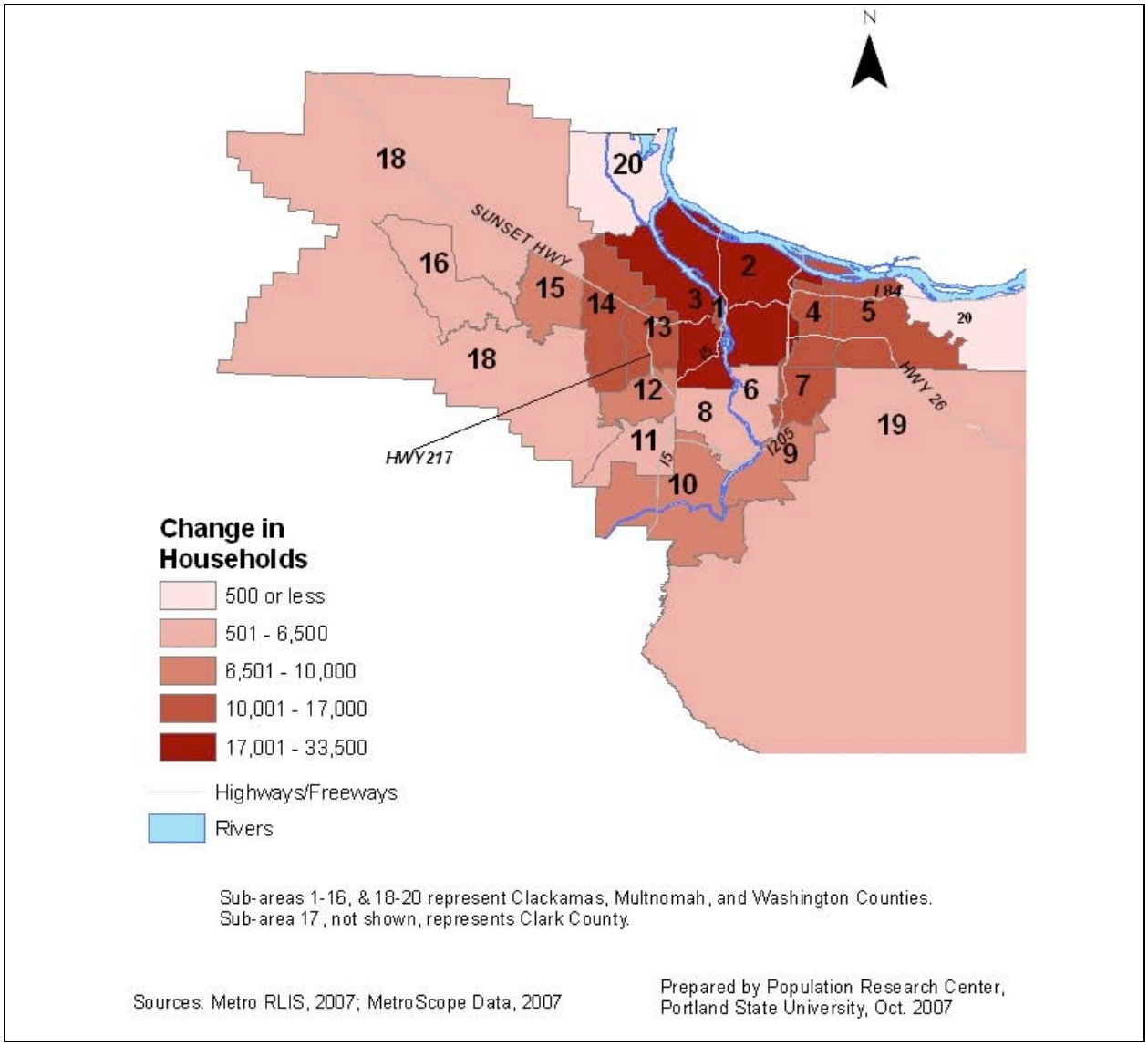


Table 3-4. Cost Burdened Households by Subarea, 2035: Renters and Owners

Subarea	Pct Households Paying 30 % or more for Housing Costs	Subarea's Share of Total Region's Households	Subarea's Share of Total Region's Cost Burdened Households (30%)	Subarea's Median Household Income (Constant $)
1	81.4%	2.6%	4.3%	$44,521
2	66.5%	17.5%	24.0%	$28,443
3	57.5%	9.1%	10.8%	$48,604
4	63.7%	5.0%	6.6%	$28,241
5	49.4%	7.8%	7.9%	$38,921
6	57.7%	3.6%	4.3%	$30,798
7	30.9%	7.2%	4.6%	$61,666
8	23.3%	4.3%	2.1%	$90,479
9	47.5%	3.1%	3.0%	$40,347
10	16.6%	7.3%	2.5%	$89,221
11	36.7%	2.8%	2.1%	$51,041
12	49.4%	3.8%	3.9%	$39,664
13	48.2%	5.9%	5.9%	$36,737
14	38.8%	9.2%	7.4%	$46,274
15	51.0%	3.4%	3.6%	$37,001
16	64.1%	1.8%	2.3%	$30,557
18	36.2%	1.9%	1.4%	$58,231
19	44.4%	3.4%	3.1%	$42,228
20	40.7%	0.3%	0.2%	$53,978
3-County Area	48.6%	100.0%	100.0%	$48,907

Tables 3-5 and 3-6 show the percentage of households spending 30 percent or more of their income on housing for renters only, for 2005 and 2035 respectively, by subarea. As you would expect, renters are more likely to be cost burdened than owners in both years. The percentage of renters that pay more than 30 percent of their income for housing rises from 51.5 percent in 2005 to 57.2 percent in 2035.

Table 3-5. Cost Burdened Households by Metro Region Subarea, 2005: RENTERS ONLY

Subarea	Pct Households Paying 30 % or more for Housing Costs	Subarea's Share of Total Region's Households	Subarea's Share of Total Region's Cost Burdened Households (30%)	Subarea's Median Household Income (Constant $)
1	68.2%	3.0%	4.0%	$17,040
2	60.5%	24.8%	29.2%	$25,160
3	59.6%	9.5%	11.0%	$24,560
4	55.8%	6.2%	6.8%	$26,040
5	48.4%	8.0%	7.6%	$29,040
6	51.5%	4.9%	4.9%	$28,600
7	43.0%	2.7%	2.2%	$32,410
8	37.8%	3.2%	2.4%	$46,310
9	45.6%	1.9%	1.7%	$31,170
10	42.0%	2.2%	1.8%	$36,250
11	40.2%	2.2%	1.7%	$36,200
12	46.9%	3.9%	3.6%	$31,050
13	47.2%	8.3%	7.6%	$30,830
14	37.3%	10.7%	7.8%	$38,660
15	39.0%	3.6%	2.7%	$37,870
16	57.6%	1.8%	2.0%	$23,980
18	52.1%	0.8%	0.8%	$34,970
19	56.0%	2.0%	2.2%	$28,210
20	63.4%	0.2%	0.2%	$36,490
3-County Area	51.5%	100.0%	100.0%	$29,520

Table 3-6. Cost Burdened Households by Subarea, 2035: RENTERS ONLY

Subarea	Pct Households Paying 30 % or more for Housing Costs	Subarea's Share of Total Region's Households	Subarea's Share of Total Region's Cost Burdened Households (30%)	Subarea's Median Household Income (Constant $)
1	80.2%	3.7%	5.2%	$15,550
2	66.0%	21.9%	25.3%	$20,770
3	71.8%	10.3%	13.0%	$19,900
4	62.4%	6.2%	6.8%	$21,510
5	52.2%	8.4%	7.6%	$25,320
6	56.6%	4.0%	3.9%	$22,460
7	47.5%	5.5%	4.6%	$29,720
8	39.8%	2.7%	1.9%	$39,840
9	50.1%	2.5%	2.2%	$25,200
10	50.4%	2.0%	1.7%	$29,920
11	46.1%	2.0%	1.6%	$28,830
12	53.4%	3.3%	3.1%	$24,300
13	53.7%	8.0%	7.5%	$24,900
14	43.3%	11.2%	8.5%	$30,240
15	42.0%	3.7%	2.7%	$29,430
16	64.1%	1.5%	1.7%	$18,020
18	45.1%	1.0%	0.8%	$33,820
19	51.7%	2.1%	1.9%	$25,240
20	61.4%	0.1%	0.1%	$32,930
3-County Area	57.2%	100.0%	100.0%	$24,410

Renters of Multi-Family Units

As shown in Figure 3-22, renters of multi-family units are more likely to spend greater than 30 percent of their income on housing, and they are also more likely to spend greater than 40 percent of their income on housing; but very few, compared to all households, spend 50 or 60 percent of their income on housing. Nevertheless, these percentages will grow by several percentage points between 2005 on 2035. The map shown in Figure 3-23 shows the current distribution of renters of multifamily units spending more than 30 percent of their income on housing. Figure 3-24 shows how the change in these households between 2005 and 2035 is distributed across the region by subarea. The greatest increases occur in Subareas 2 and 14.

Figure 3-22. Percent of Income Spent on Housing 2005-2035: Renter Multi-Family Units

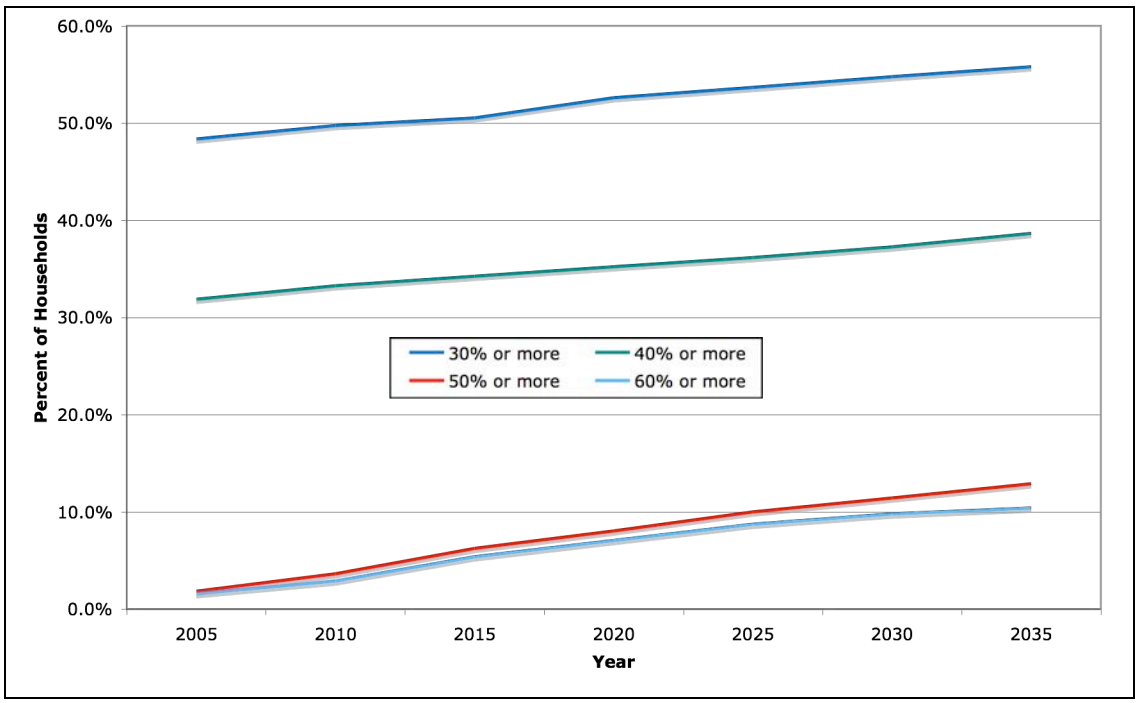


Figure 3-23. Renter Multi-Family Households Paying 30 percent or More of their Income for Housing, 2005, by Metro Region Subarea

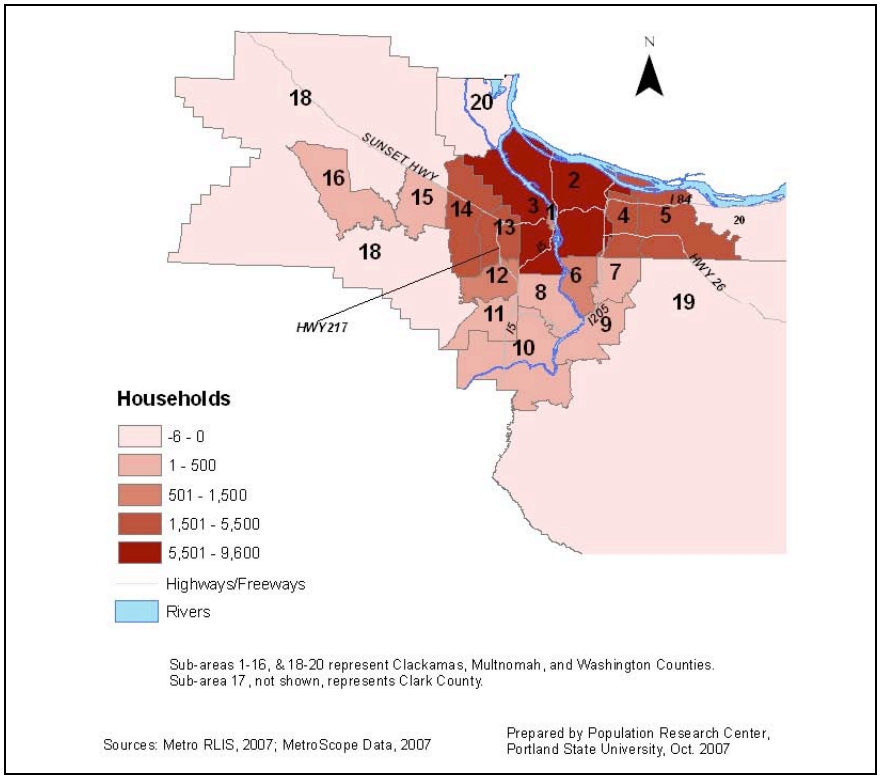
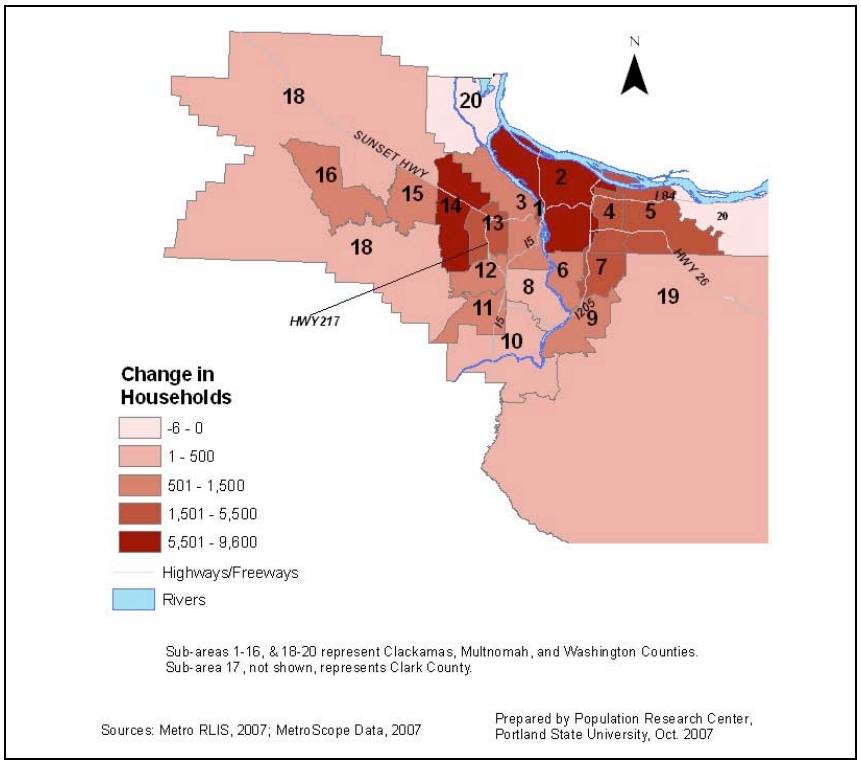


Figure 3-24. Change in Renter Multi-Family Households Paying 30 Percent or More of their Income for Housing, 2005 to 2035, by Metro Region Subarea



Renters of Single-Family Units

Figure 3-25 shows the percentage of households among renters of single-family units that spend greater than 30, 40, 50, and 60 percent of their income on housing. Over 60 percent of these renters are spending greater than 30 percent of their income on housing in 2005. These rates are fairly stable over time, although by 2035, about 10 percent of these households will be spending 50 percent or more of their income on housing.

Figure 3-26 shows how renters of single-family units spending greater than 30 percent of their income on housing these households are distributed across the region by subarea. Figure 3-27 shows the change by subarea from 2005 to 2035. The largest increase occurs in Subarea 2.

Figure 3-25. Percent of Income spent on Housing 2005-2035: Renter Single-Family Units

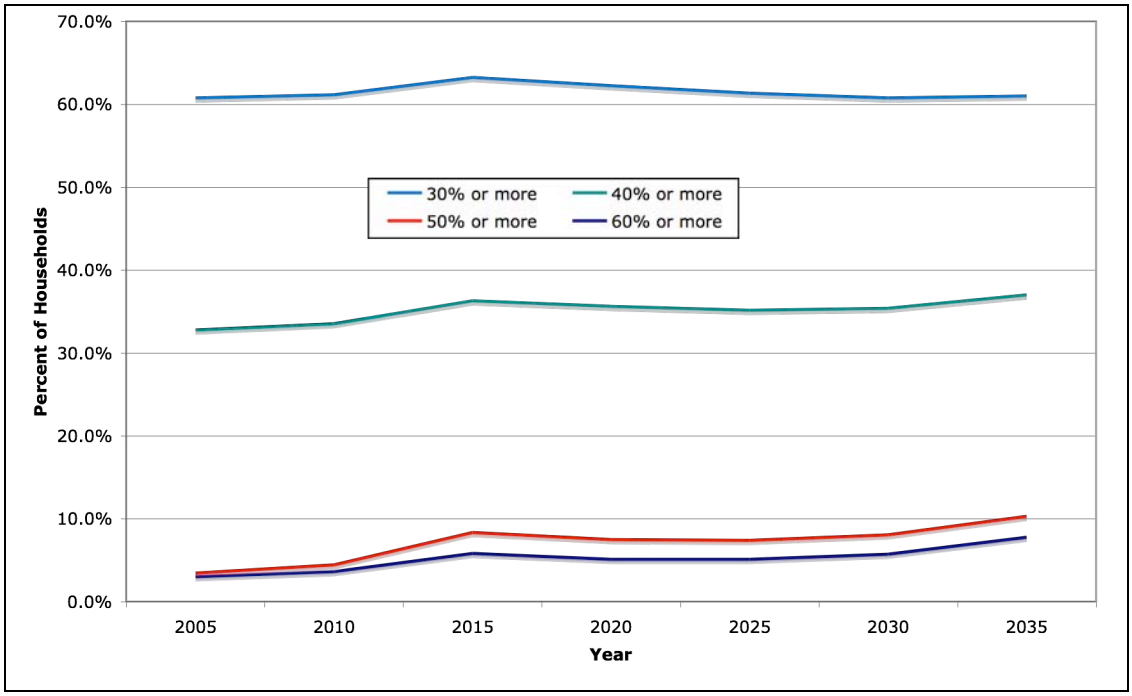


Figure 3-26. Renter Single-Family Households Paying 30 percent or more of their Income for Housing, 2005 by Metro Region Subarea

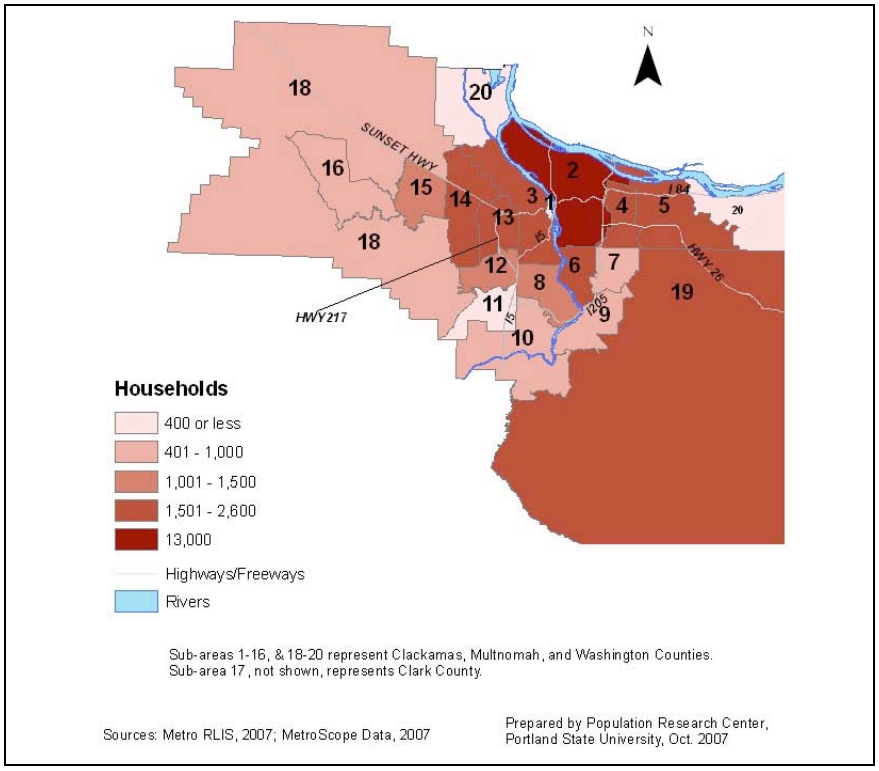
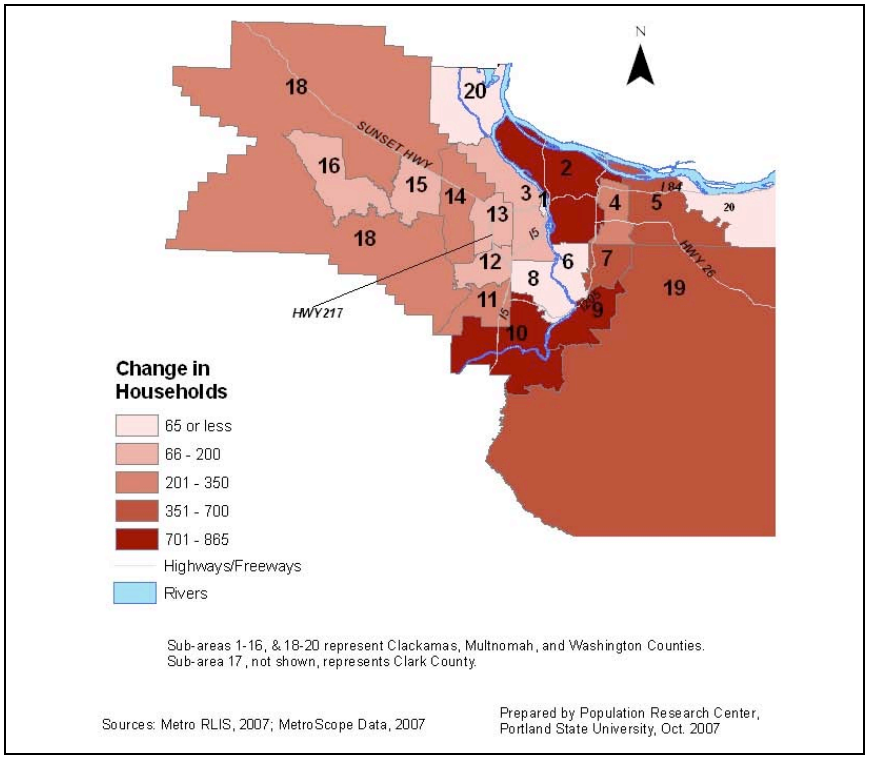


Figure 3-27. Change in Renter Single-Family Households Paying 30 percent or More of their Income for Housing, 2005 to 2035, by Metro Region Subarea



Owners of Single-Family Units

The owners of single-family units represent a very large part of the housing market. As Figure 3-28 shows, over 40 percent of these owners spend more than 30 percent of their income on housing. This is expected to grow to almost 50 percent by 2025 and then flatten out. Almost one-quarter of these owners will be spending 40 percent or more of their income on housing by 2025.

The map in Figure 3-29 shows the owners of single-family units spending greater than 30 percent of their income on housing by Metro region subarea; Figure 3-30 shows the change in the number of these households between 2005 and 2035 by subarea.

Figure 3-28. Percent of Income Spent on Housing 2005-2035: Owner Single–Family Units

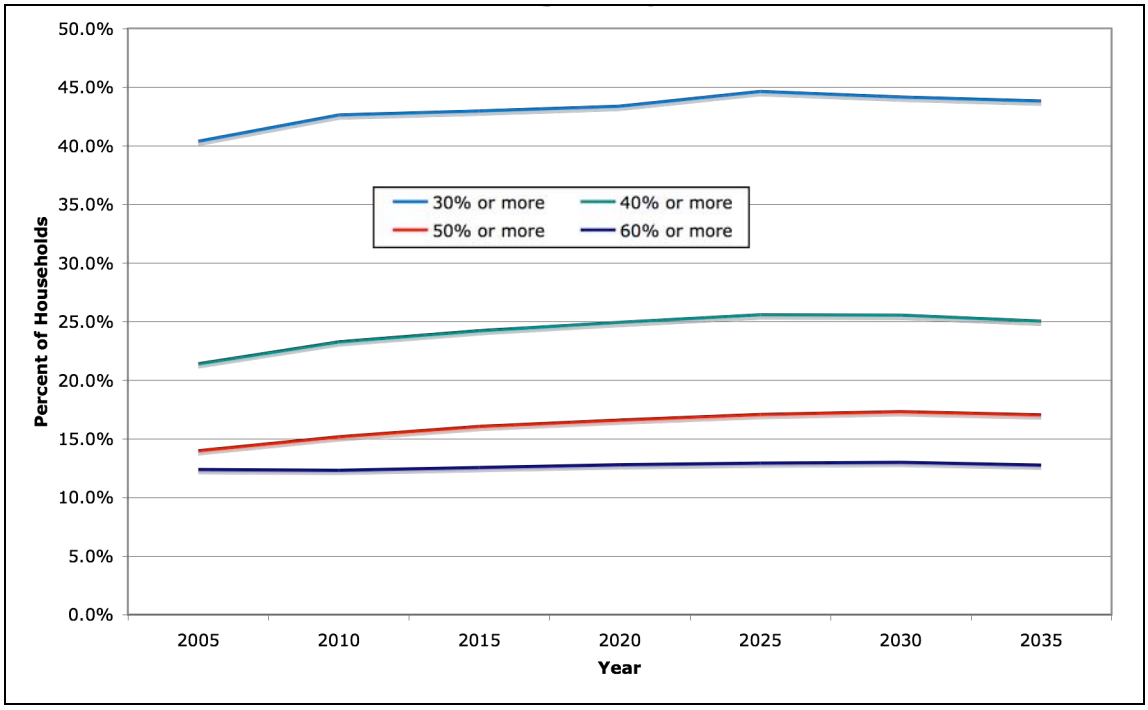


Figure 3-29. Owner Single-Family Households Paying 30 percent or more of their Income for Housing, by Metro Region Subarea

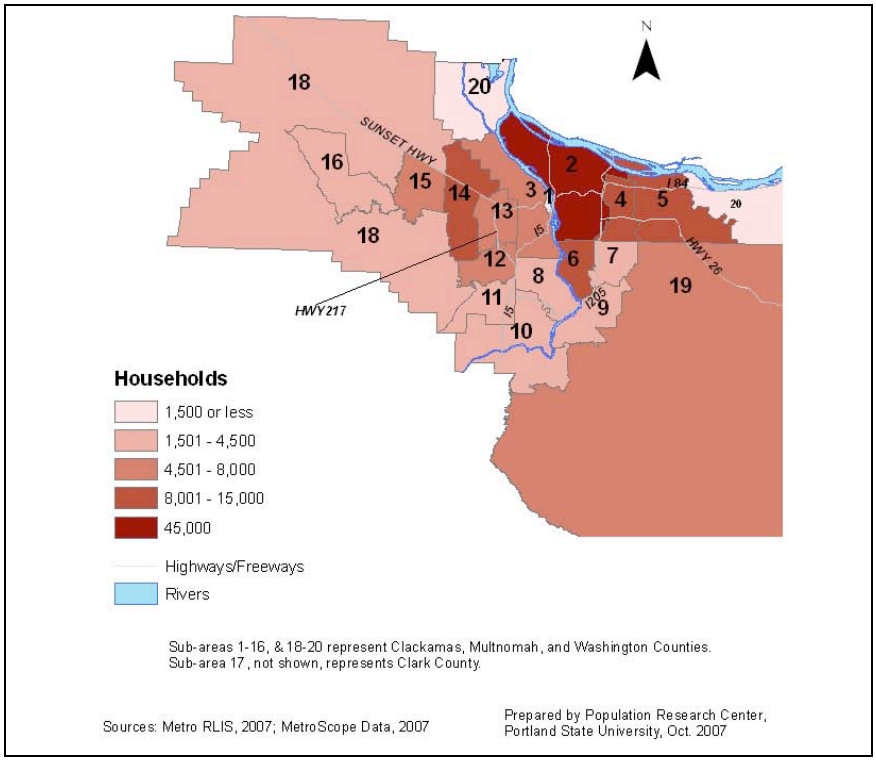
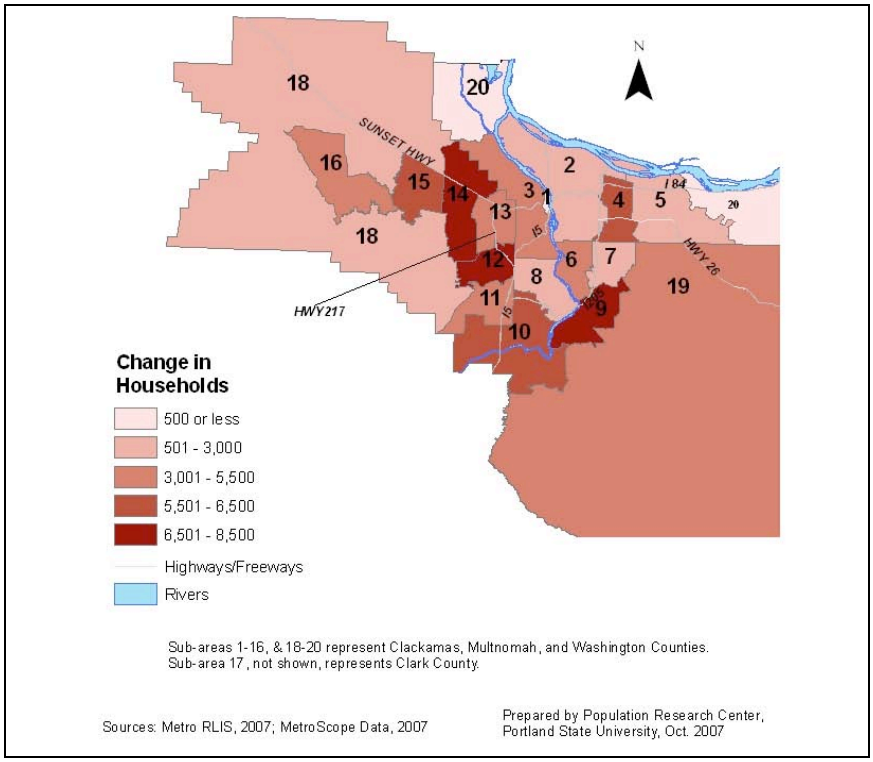


Figure 3-30. Change in Owner Single-Family Households Paying 30 percent or more of their Income for Housing 2005 to 2035, by Metro Region Subarea



Owners of Multifamily Units

Figure 3-31 shows a dramatic change over time for owners of multifamily units who are spending 30 percent or more of their income on housing. Currently at about 32 percent, these percentages will rise to over 60 percent by 2035. The model predicts similar rises in the households spending 40, 50, and 60 percent or more of their income on housing. The rise is steep from 2005 to 2020, and then flattens out. This is due to a number of trends. First, while the development of owner multifamily housing is currently concentrated in expensive locations, as the market matures, developers may turn to lower cost locations and lower quality products that command lower prices. Second, *Metroscope* assumes significant increase in available UGB land after 2020. This allows for the development of single family units, which reduces the demand and relative prices for owner multifamily housing.

The map in Figure 3-32 shows the distribution of owners of multifamily units spending greater than 30 percent of their income on housing. Figure 3-33 shows the change by Metro region subarea.

Figure 3-31. Percent of Income Spent on Housing 2005-2035: owner Multi-Family Units

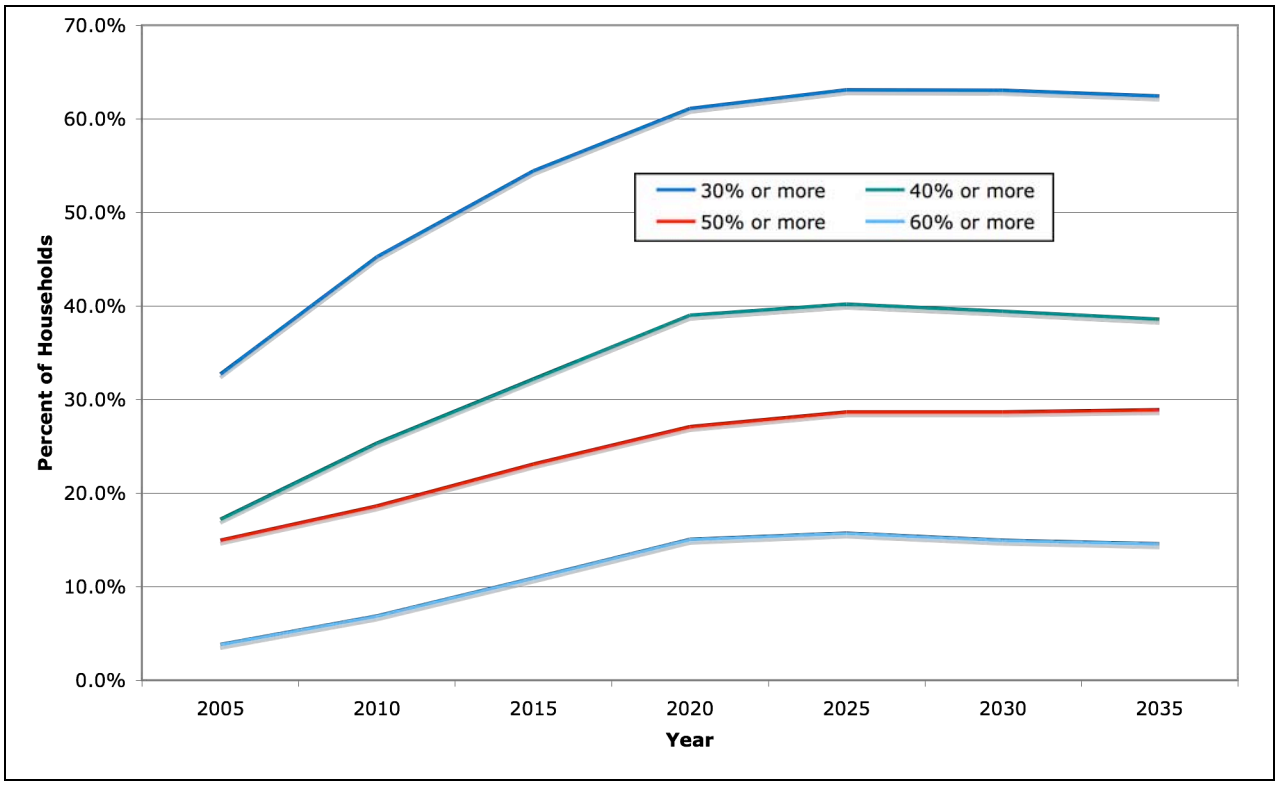


Figure 3-32. Owner Multifamily Households Paying 30 percent or more of their income for Housing 2005, by Metro Region Subarea

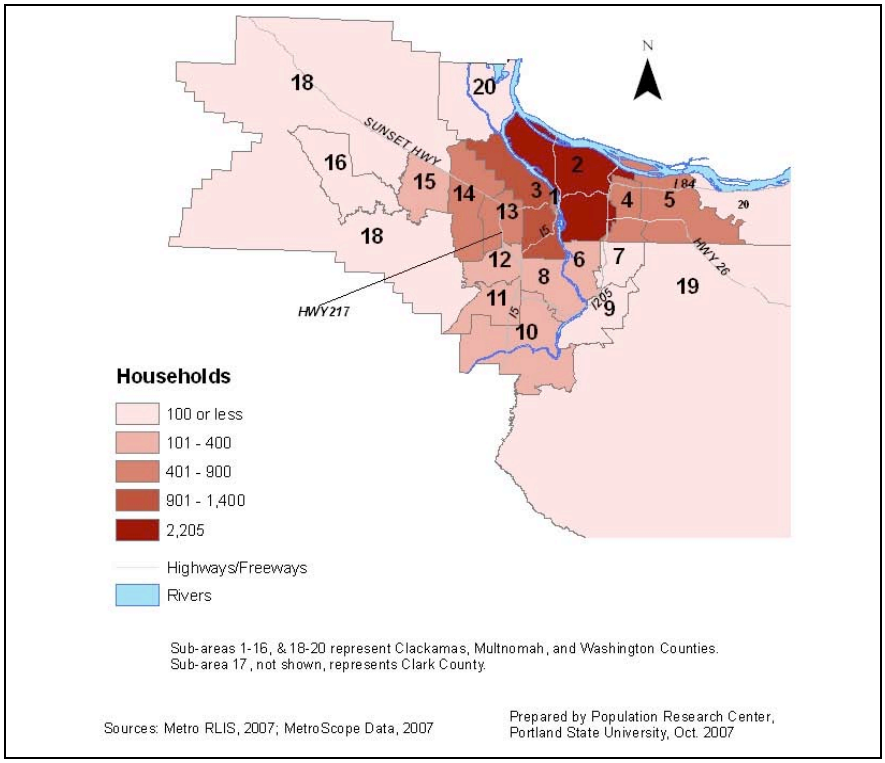
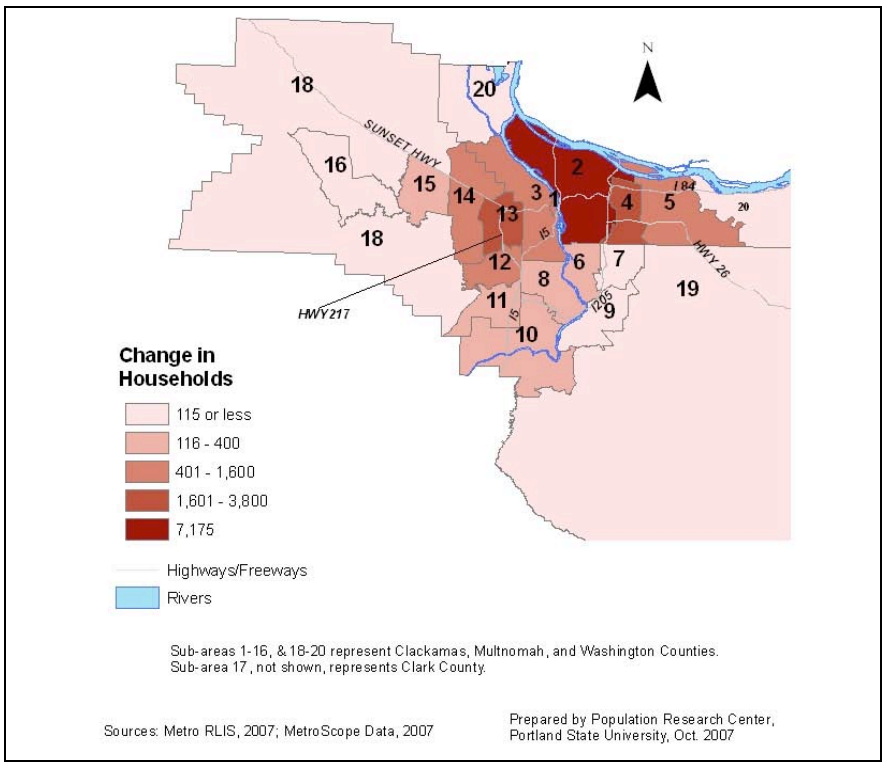


Figure 3-33 Change in Owners Multifamily Households Paying 30 percent or more of their Income for Housing 2005 to 2035, by Metro Region Subarea



What demographic groups are most cost burdened?

We can gain additional understanding of the demographics of cost-burdened households by analyzing them based on the consumption bins described in Figures 2-2 and 2-3. Recall that the eight consumption bins have progressively higher income and social status than lower-numbered groups, and that average age varies considerably among these groups. Also, these consumption bins vary somewhat between owners and renters; thus our analysis is a bit different for each type of housing.

For reference, Table 3-5 shows the information contained in Section 2 about the characteristics of Consumption bins for renters.

Figures 3-34 and 3-35 show how the lowest income consumption bins, bins 1 and 2, are distributed throughout the region, and how we expect that distribution to change from 2005 to 2035.

Table 3-5. Household Characteristics by Consumption Bin, Renters

Bin	1: Low-Income Singles	2: Working Class	3: Emerging Singles	4: Established Singles and Couples	5: Young Middle-Income Families	6: Fast-Track Families	7: Successful Middle-Aged	8: Movers & Shakers with Kids
Avg Hhold Income	$10,000	$10,000	$18,600	$25,300	$30,100	$38,600	$54,000	$87,500
Avg Hhold Age	65.7	43.1	51.2	54.2	50.3	47.7	49.7	46.4
Avg Hhold Size	1.0	1.9	1.5	1.6	2.3	2.6	2.6	3.4

Figure 3-34. Distribution of Bin 1 and Bin 2 Households by Metro Region Subarea, 2005

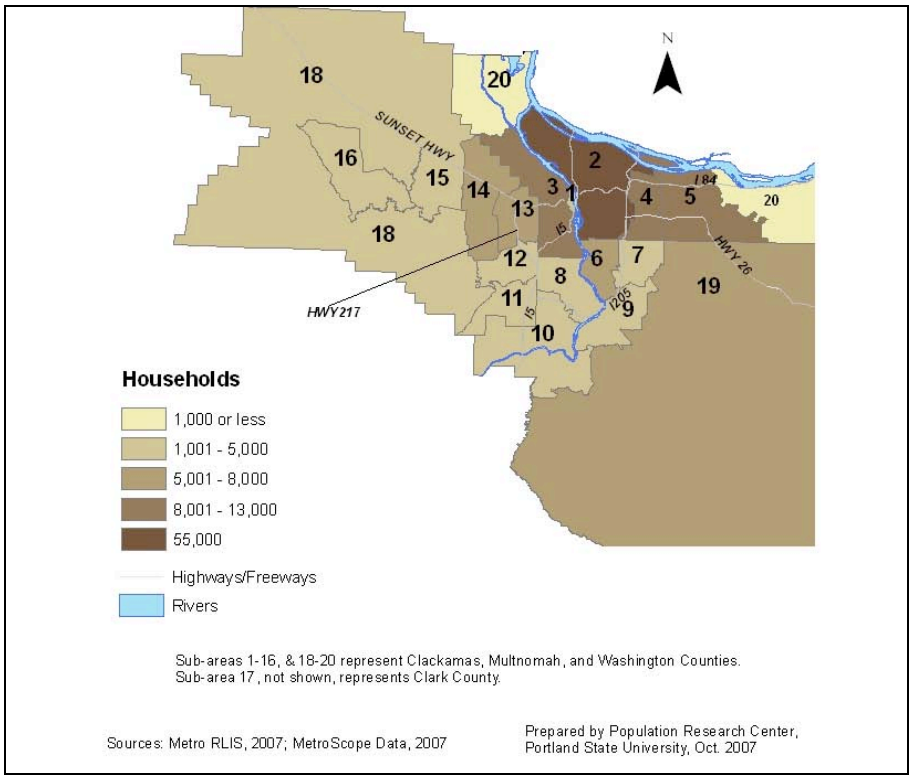
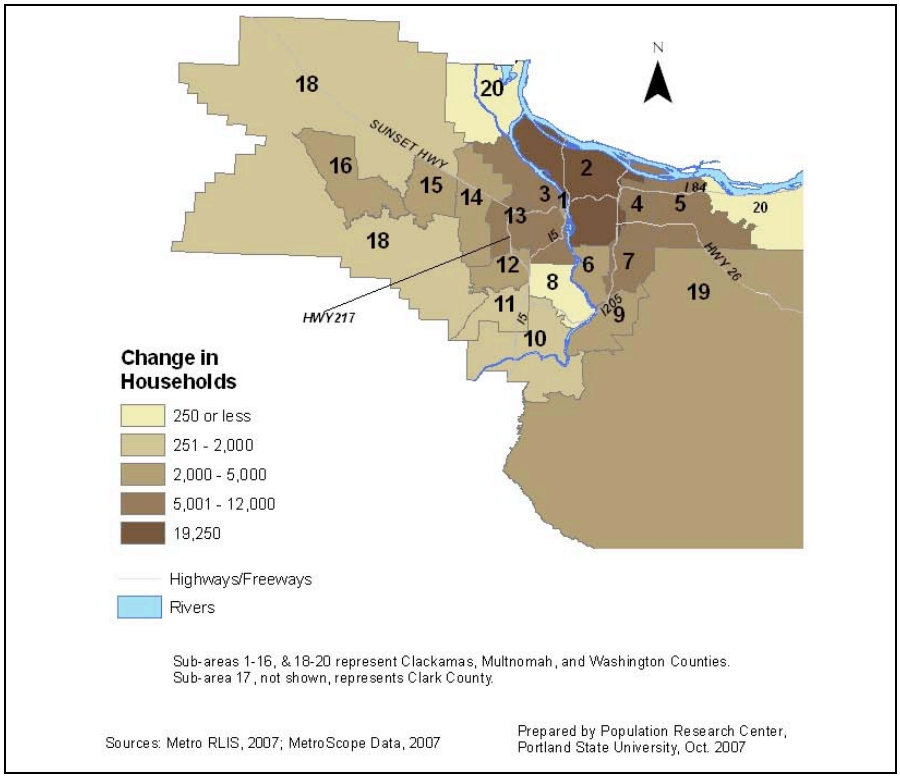


Figure 3-35. Change in Bin 1 and Bin 2 Households by Subarea 2005 to 2035



Rental Multifamily

Figures 3-36 and 3-37 show the percent of households in each bin that is spending at least 30 percent and at least 50 percent of their income on housing, respectively. Figure 3-36 shows that for consumption bins 1 and 2 (low-income singles and working class), virtually all households are spending at least 30 percent of their income on housing, and this will not change by 2035. Bins 1 and 2 will also experience large increases in the percentage of households paying at least 50 percent of their income for housing by 2035. Figures 3-38 and 3-39 show how Bin 1 and Bin 2 rental multifamily households are distributed across the region and how this changes over time.

Figure 3-36. Percent of Households Exceeding 30% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Rental Multifamily Units

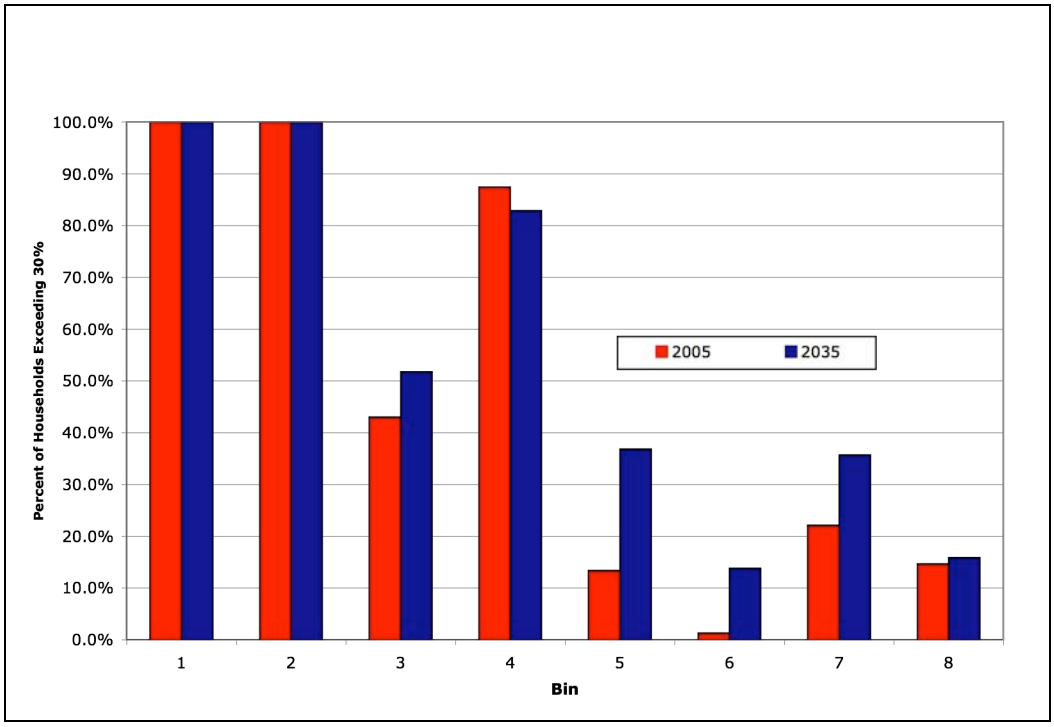


Figure 3-37. Percent of Households Exceeding 50% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Rental Multifamily Units

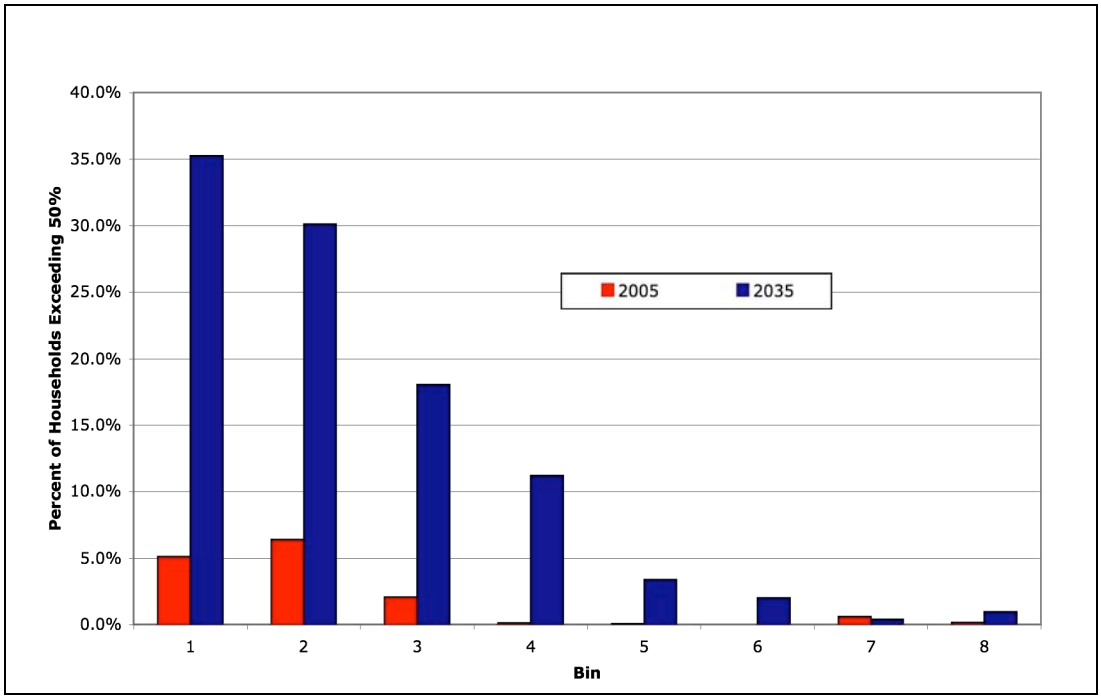


Figure 3-38. Bin 1 and Bin 2 Households by Subarea, 2005: Rental Multifamily Units

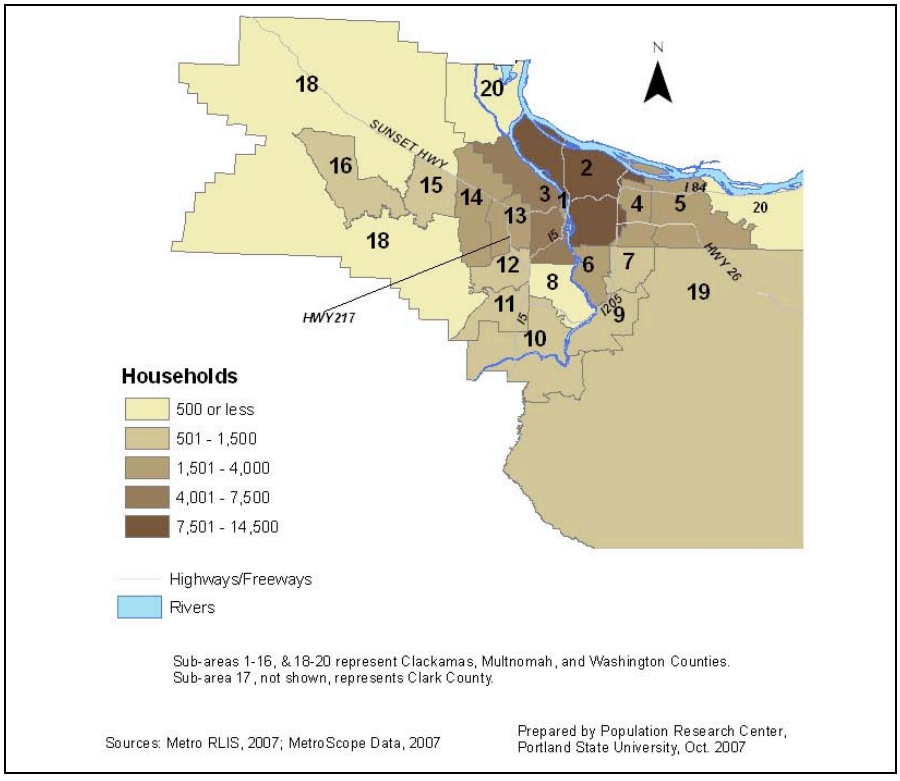
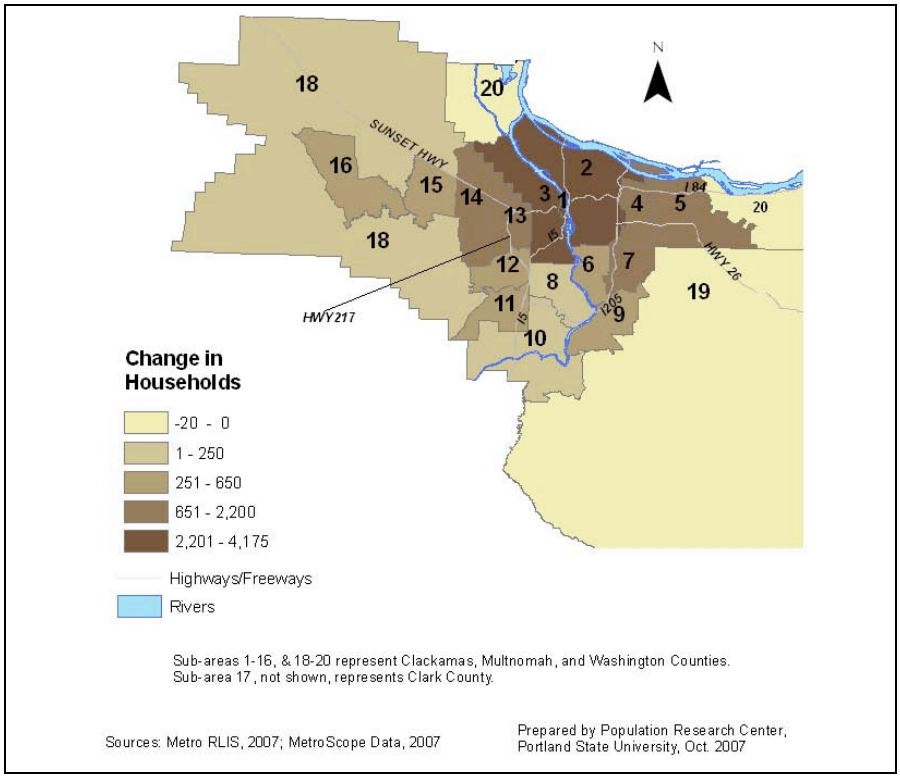


Figure 3-39. Change in Bins 1 and Bin 2 Households by Subarea, 2005 -2035: Rental Multifamily Units



Rental Single-Family

Rental single-family housing is a very small part of the market; however, it appear that many people choosing this housing type are spending a large percentage of their income on housing—even among the higher income consumption bins.

Figure 3-40 shows that once again, virtually all households in bins 1 and 2 (low income and working class) are exceeding 30 percent of their income in housing costs. Even in bins 4 and 6, (established singles and couples; young middle-income families) a significant share of these renters are spending over 30 percent of their income on housing; however, these percentages will decrease by 2035. Within this market segment bins 1, 3, and 5 will increase the shares of households spending greater than 50 percent of their income on housing as shown in Figure 3-41.

Figures 3-42 and 3-43 show how the Bin 1 and Bin 2 households in rental single family housing are distributed across the region, and how these numbers change from 2005 to 2035.

Figure 3-40. Percent of Households Exceeding 30% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Rental Single-Family Units

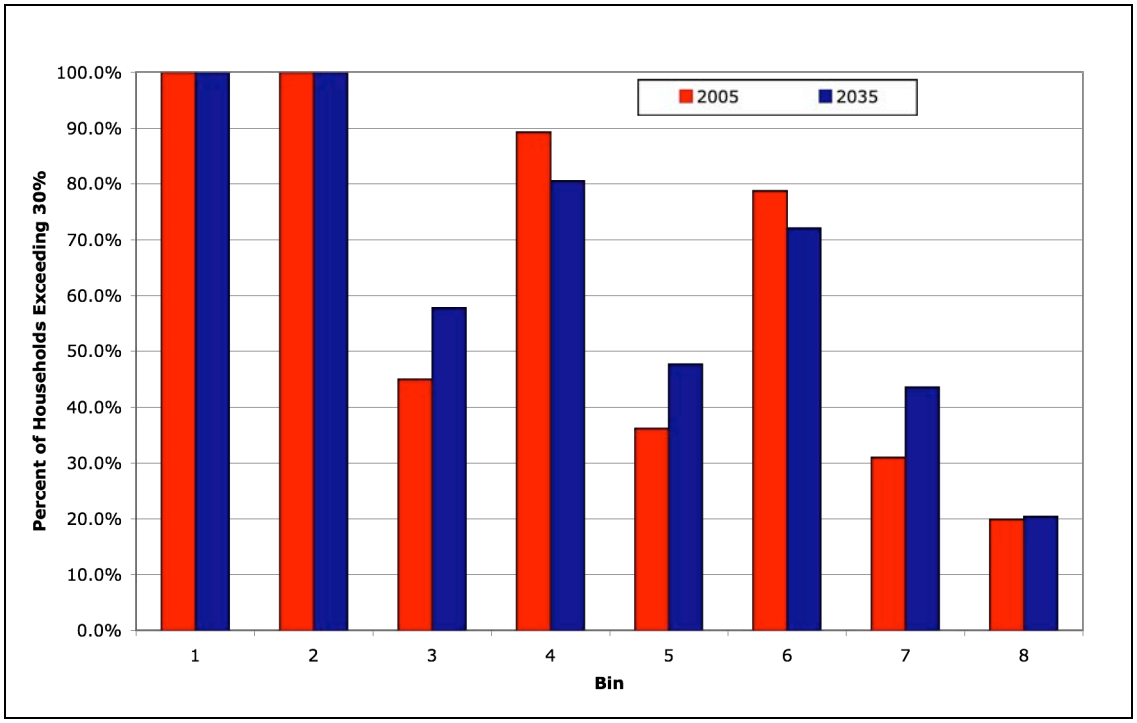


Figure 3-41. Percent of Households Exceeding 50% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Rental Single-Family Units

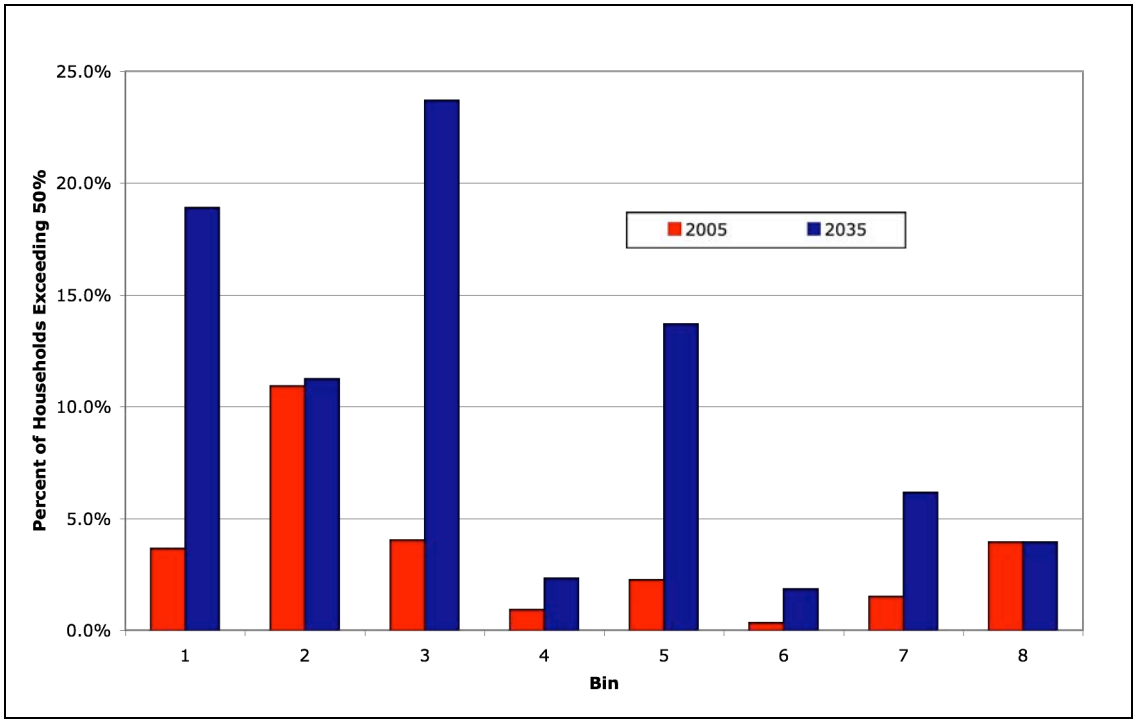


Figure 3-42. Bin and Bin 2 Households by Subarea, 2005: Rental Single-Family Units

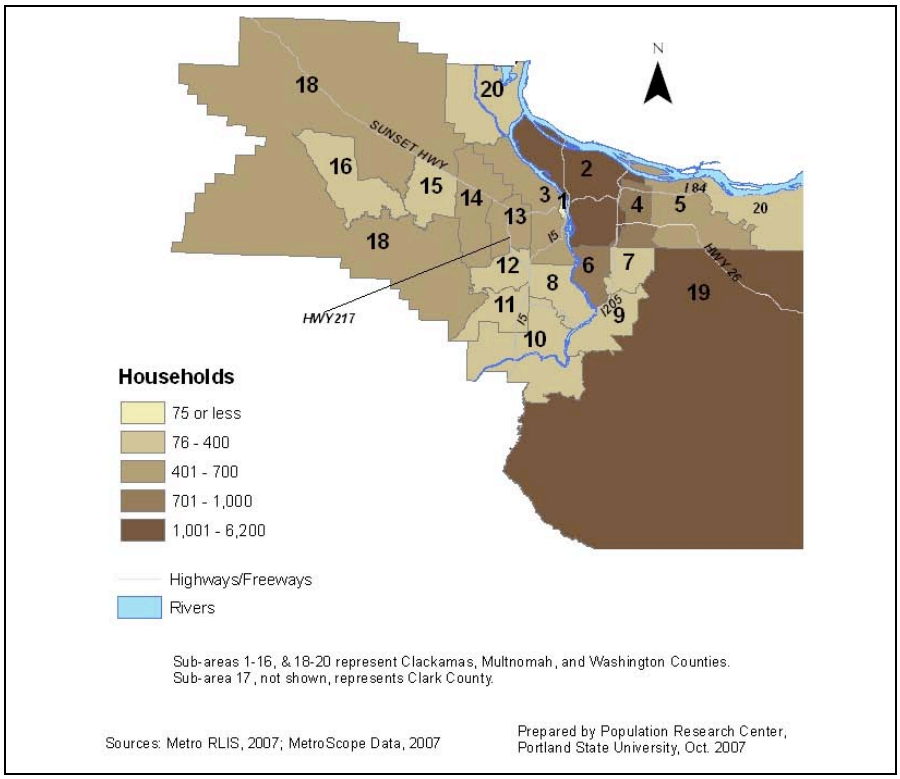
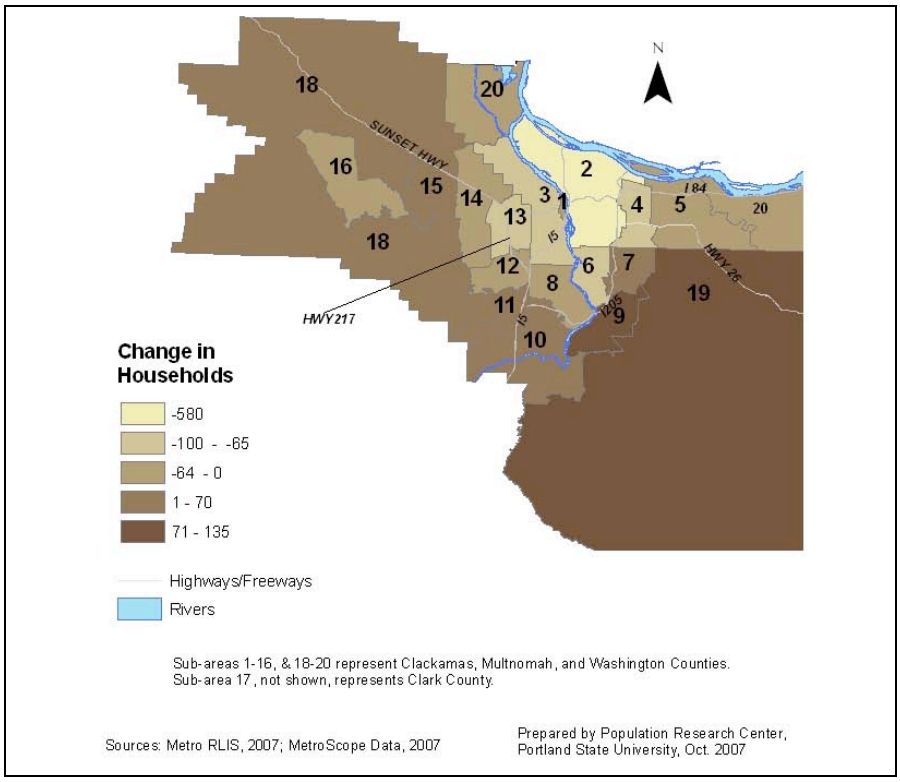


Figure 3-43. Change in Bin 1 and Bin 2 households by Subarea, 2005 to 2035: Rental Single-Family Units



Owner Single-Family

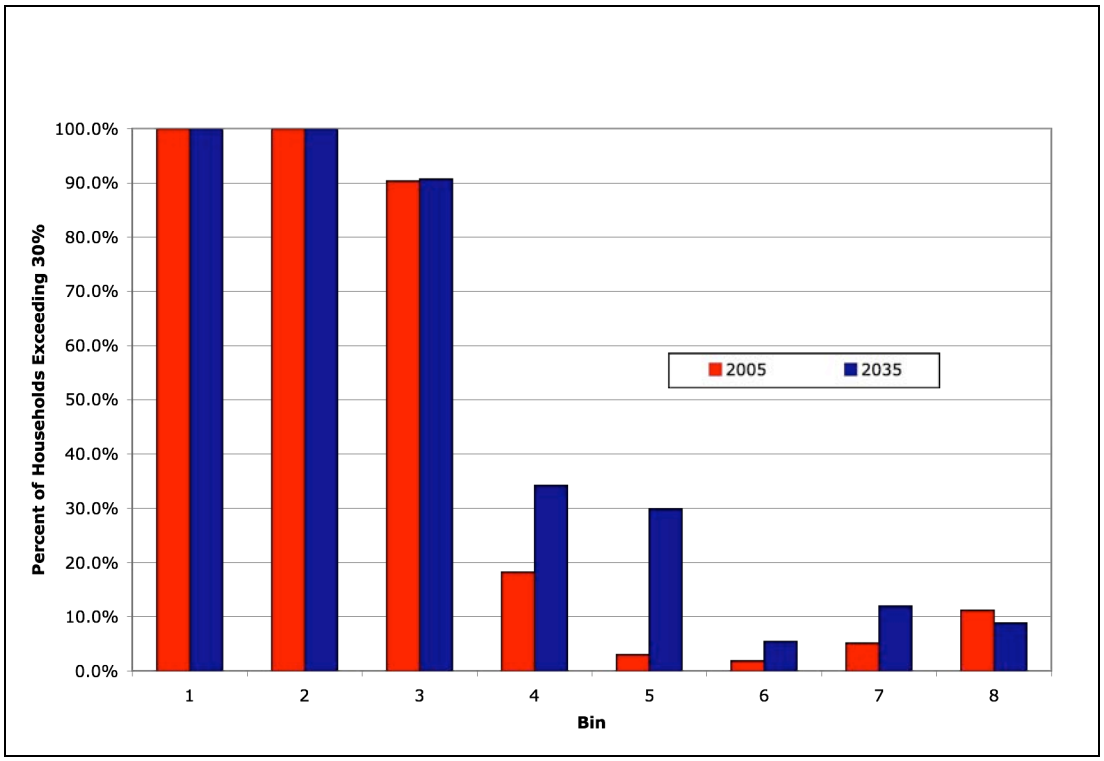
Recall that, as shown in Figures 2-2 and 2-3, consumption bins for owners have slightly different demographic characteristics than those of renters; these are summarized in Table 3-6. Income still rises with bin number, although average income is higher for owners than for renters in all bins. Age is much less variable for owners than for renters. Household size is larger for owners than renters for almost all bins.

Table 3-6. Household Characteristics by Consumption Bin, Owners

Bin	1: Low-Income Singles	2: Working Class	3: Emerging Singles	4: Established Singles and Couples	5: Young Middle-Income Families	6: Fast-Track Families	7: Successful Middle-Aged	8: Movers & Shakers with Kids
Avg Income	$13,200	$27,000	$37,400	$48,100	$58,800	$77,000	$101,300	$104,000
Avg Age	53.2	54.2	47.5	48.0	46.1	47.2	51.4	43.1
Avg Hhold Size	1.5	1.9	2.4	2.8	3.2	3.1	2.9	4.2

Households in owner single-family units in consumption bins 1, 2, and 3 (low-income singles; working class; and emerging singles) are almost universally spending more than 30 percent of their income on housing, as shown in Figure 3-44. These percentages change little between 2005 and 2035 (Figure 3-45). However, for bins 4 and 5, there are dramatic increases in the percentage of households spending 30 percent or more of their income on housing by 2035.

Figure 3-44. Percent of Households Exceeding 30% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Owner Single-Family Units



Bin 1 households are universally spending more than 50 percent of their income for housing. Figure 3-45 shows that Bin 2 households spending 50 percent or more of their income on housing will double by 2035. The distribution of Bin 1 and Bin 2 households for owner single family housing in 2005 is shown in Figure 3-46; change from 2005-2035 is in Figure 3-47.

Figure 3-45. Percent of Households Exceeding 50% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Owner Single-Family Units

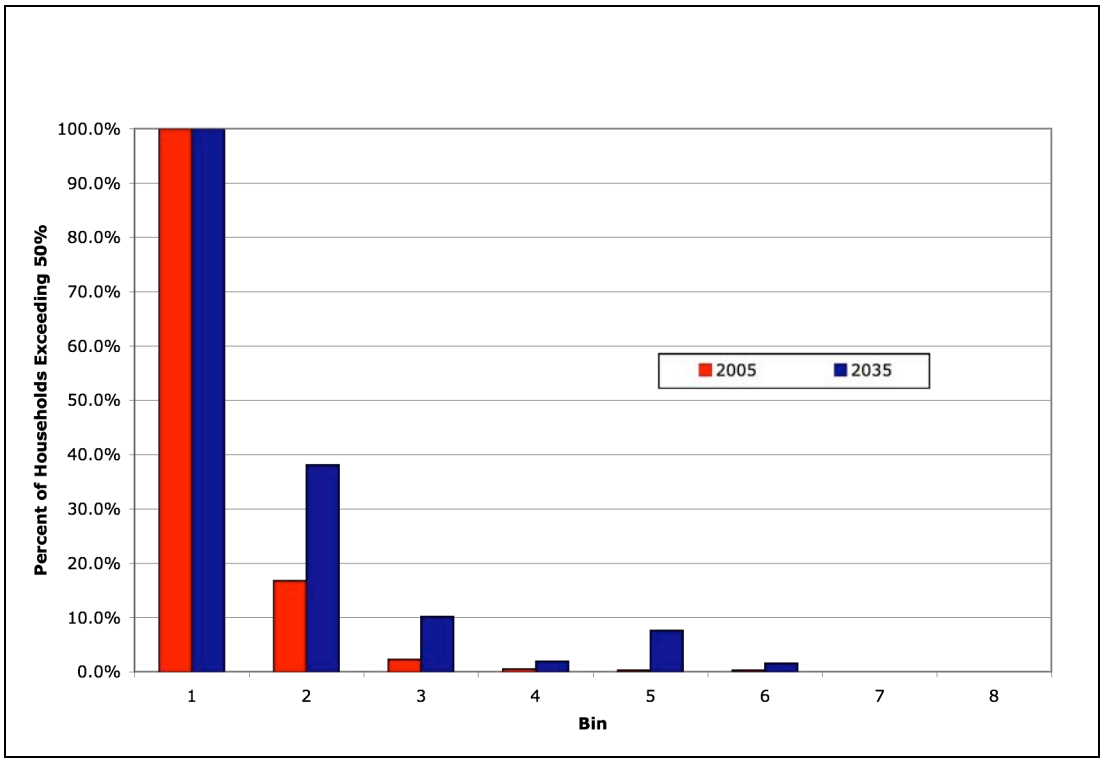


Figure 3-46. Bin 1 and Bin 2 Households by Subarea, 2005: Owner Single-Family Units

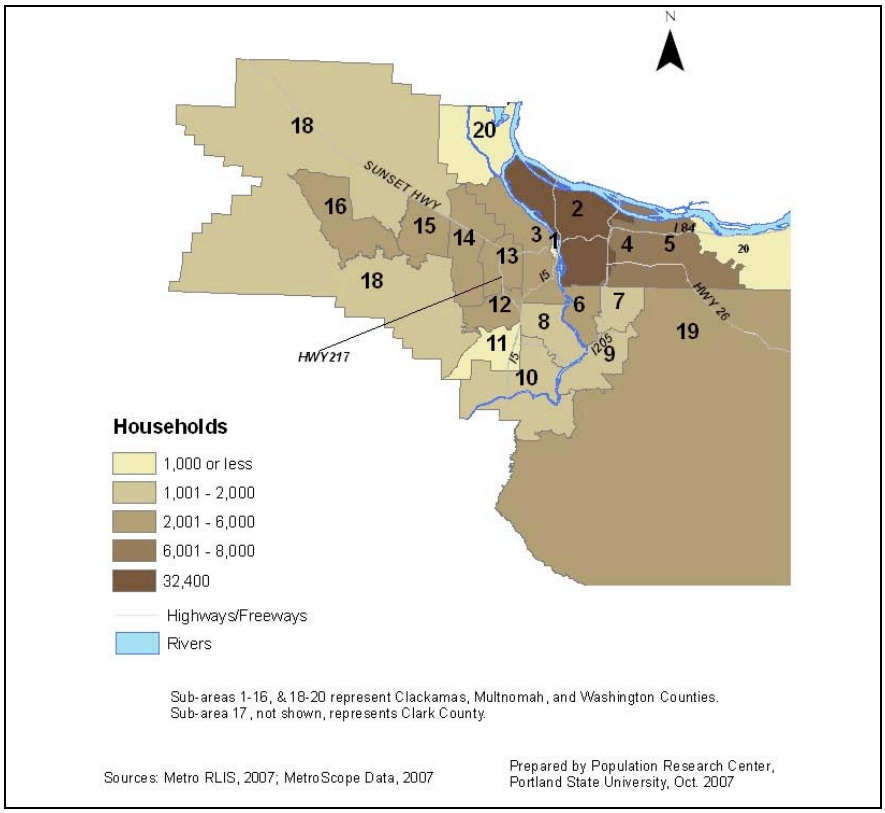
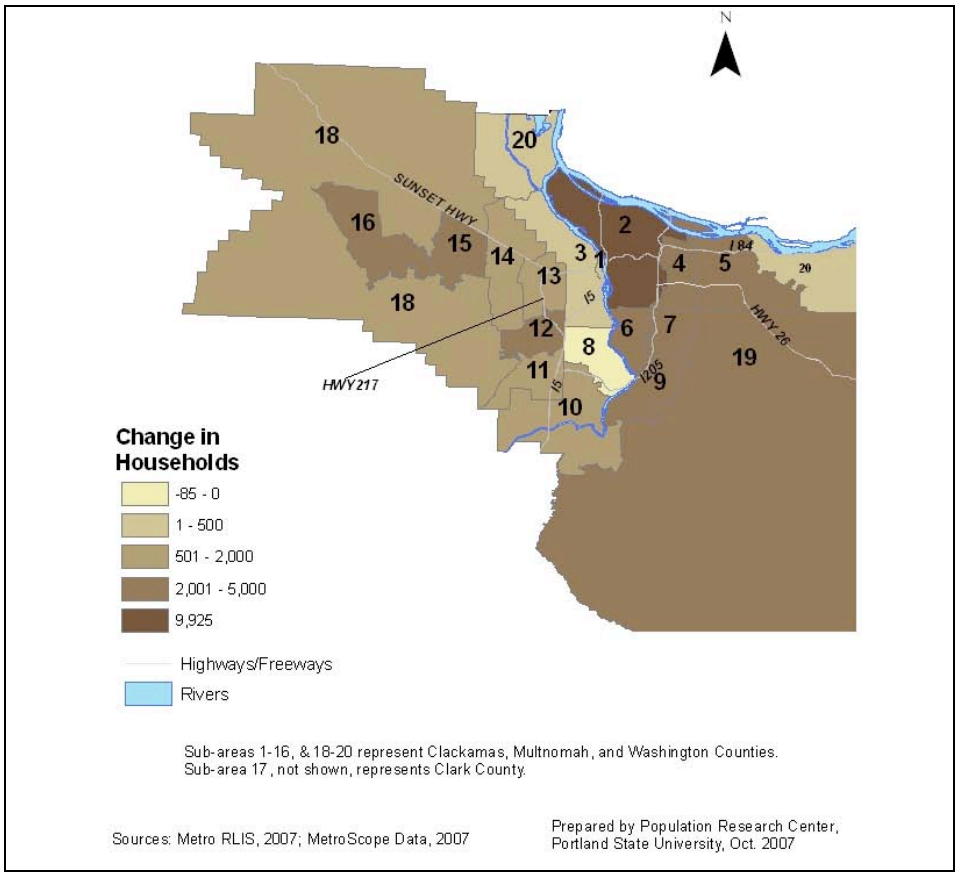


Figure 3-47. Change in Bin 1 and Bin 2 Households by Subarea, 2005 to 2035: Owner Single-Family Units



Owner Multi-Family

Among owners of multifamily housing, almost 70 percent of Bin 2 (working class) households pay 30 percent or more of their income for housing (Figure 3-48), and 100 percent of Bin 1 (low income singles) households pay 50 percent or more of their income (Figure 3-49). By 2035, Bins 2 through 7 will all experience significant gains in the percentage spending 30 percent or more on housing, while the percentage paying 50 percent or more also will increase for Bins 2 through 5.

Figures 3-50 and 3-51 show how Bin 1 and Bin 2 owners of multifamily housing are distributed through the region by subarea, and the change from 2005 to 2035.

Figure 3-48. Percent of Households Exceeding 30% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Owner Multi-Family Units

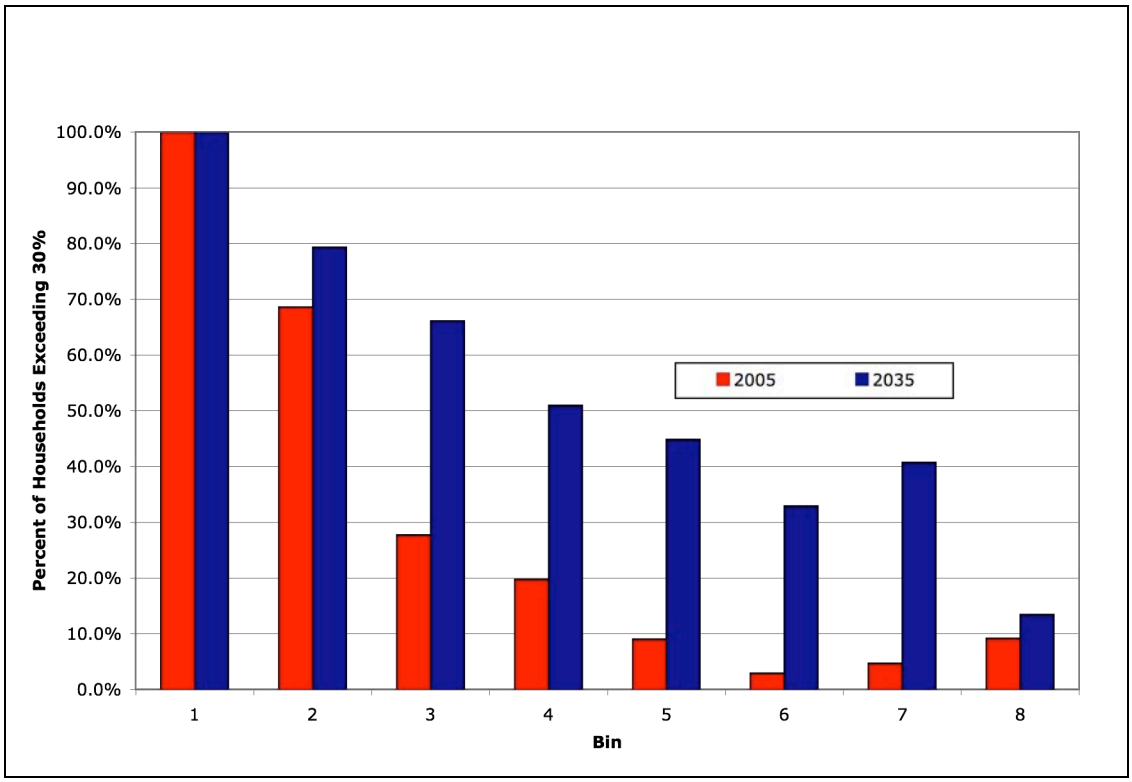


Figure 3-49. Percent of Households Exceeding 50% of Income on Housing Costs by Consumption Bin: 2005 and 2035: Owner Multi-Family Units

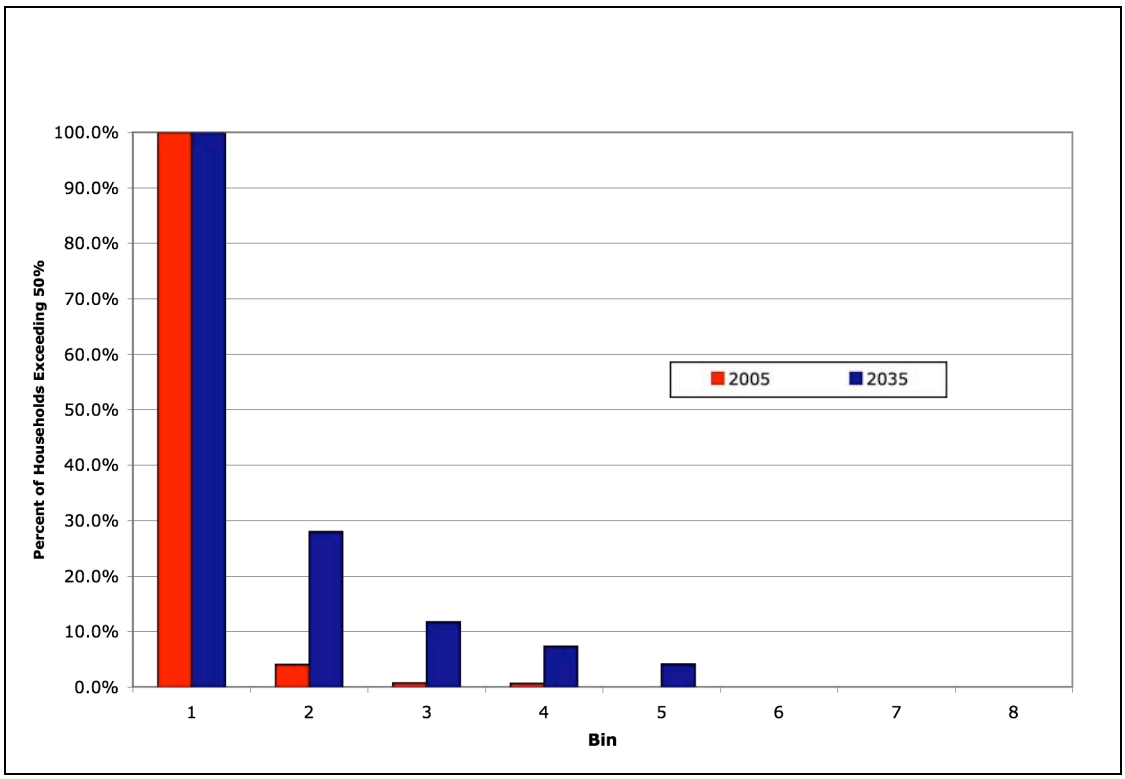


Figure 3-50. Bin 1 and Bin 2 Households by Subarea, 2005: Owner Multifamily Units

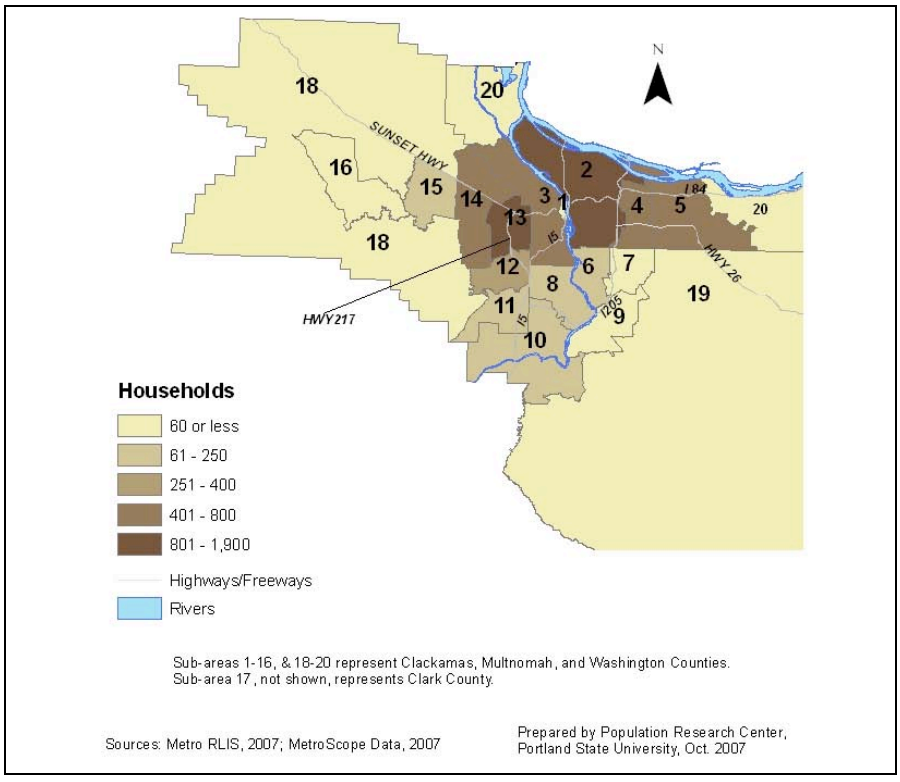
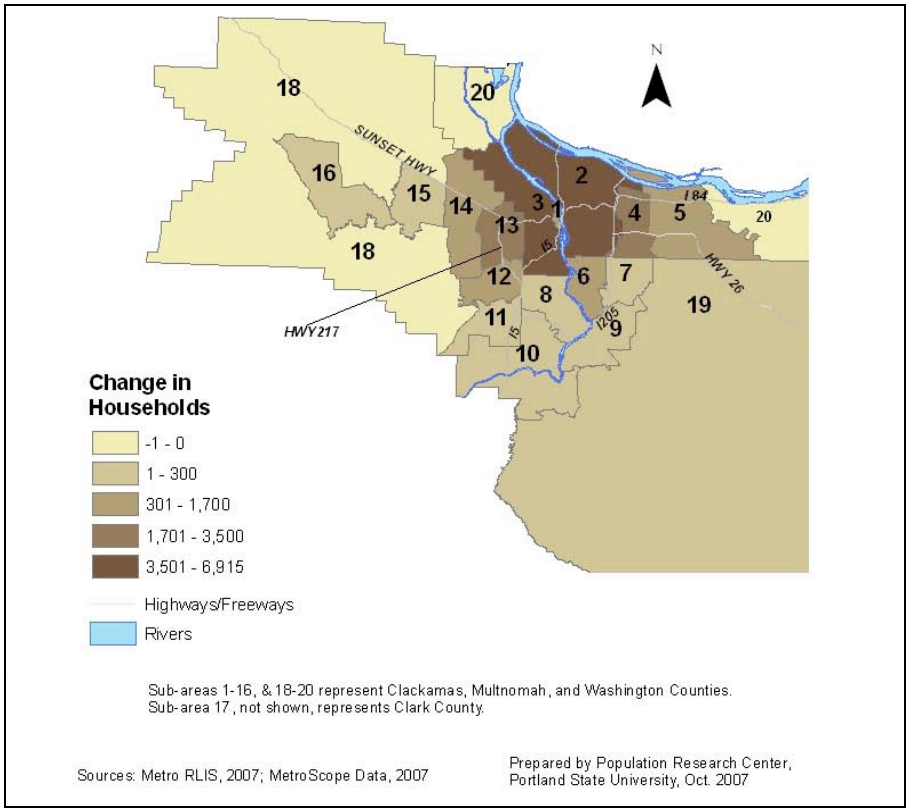


Figure 3-51: Change in Bin 1 and Bin 2 Households, 2005 to 2035: Owner Multifamily Units



4 Conclusions and Recommendations

Based on the analysis presented in Section 3, we offer several observations regarding the demographic groups and areas that will struggle to afford appropriate housing over the next 30 years. We also make some recommendations to Metro regarding improving the application of the *Metroscope* model to issues of affordable housing.

Model predictions

What demographic groups will struggle most with housing costs over the next 30 years?

Overall, the metro region's percentage of households paying 30 percent or more of their income on housing will rise from 43 percent in 2005 to 48.6 percent in 2035. These percentages are higher for renters, rising from 48.6 percent in 2005 to 51.5 percent in 2035.

The demographic groups occupying consumption bins 1 and 2 (low-income singles and working class) are most likely to struggle with housing costs, and this struggle will increase over the next 30 years. Based upon the number of units and reflecting the composition of income levels for bins 1 thru 3, rental multi-family units will pose the greatest housing hardship. This increasing cost burden will be felt region-wide, but the households mostly affected will be young and old (under 25 and 65 and over), small (a large majority living alone), with household income below $25,000 (many households under $15,000). In addition, many single-parent families with child(ren) will also comprise the most cost-burdened households, especially those in rental single-family households.

What are the key factors contributing to this struggle?

While median family income in the metropolitan region is predicted to remain about the same from 2005 to 2035, housing costs are expected to rise, increasing the percentage of income being used for housing.

Furthermore, rental single-family housing is becoming less available over time. Those groups that currently rely on this housing type (poor families with children) will need affordable alternatives. The challenge is to offer appropriate alternatives in rental multifamily housing market, which typically offers smaller living quarters.

The overwhelming majority of families with children choose owner single-family housing; yet those families purchasing single-family units, many of which occupy bins 3 and 5, are becoming more cost burdened themselves. By 2035, 90 percent of bin 3 and 30 percent of bin 5 owners will pay more than 30 percent of their income on housing; the largest jump occurs in bin 5 families. Almost ten percent of bin 3 and bin 5 families will pay more than 50 percent of their income for housing by 2035.

Although cost burden is rising for both owners and renters, this burden is felt more by renters than owners, as owners are able to build equity in their homes as housing values rise, while renters experience higher rent with no corresponding increase in wealth. Furthermore, the assets

of owners are unknown to the *Metroscope* model; thus, although many owners may appear to be paying a large percentage of their income on housing, we cannot know for certain whether owners are actually paying the mortgage costs assumed by the model.

We also observe that households experience a trade-off between transportation and housing costs. The percentage of household expenditures spent on housing and transportation is more or less constant for households in the lower 60% of income categories. Thus, while households may move away from high-cost central locations to reduce their housing cost burden, they find increasing transportation costs that offset the savings.

Where will cost burdened households be living?

Overall, the metro region's percentage of households paying 30 percent or more of their income on housing will rise from 43 percent in 2005 to 48.6 percent in 2035. Those subareas that will have a higher than average rate of cost-burdened households include subareas 1 through 6, 12, 13, 15, and 16. The only subareas in which the percentage of cost-burdened households falls are Subareas 8 and 10.

Housing affordability is clearly a continuing challenge in several districts. The district with the highest percentage of households paying 30 percent or more of their income on housing in 2005 is District 1, with 61.7; by 2035 it will still have the highest percentage with 81.4 percent. Its share of these households will double so that in 2035 its share will be 4.3 percent, compared with its 2.6 percent share of total households.

District 2, with a large percentage of total households (22.4 percent in 2005), will also experience an increase in cost-burdened households. But its share of the total will fall from 30.6 percent in 2005 to 24 percent in 2035. This is only about 40 percent higher than its share of total units in 2035 (17.5 percent).

District 3 (near west) increases its percentage of households paying 30 percent or more of their income on housing from 41.1 percent in 2005 to 57.5 percent in 2035. Their share of cost burdened households increases from 8.1 percent to 10.8 percent, as does its share of total households (8.5 percent to 9.1 percent).

District 16 (far west) will continue to struggle with affordability but its share of cost-burdened households will not significantly increase. In this district, the percentage of households paying 30 percent or more on housing will rise from 55 percent in 2005 to 64.1 percent in 2035. However, its share of these cost-burdened households will only increase from 2.2 percent to 2.3 percent.

As we consider the relative cost burden of different parts of the region, we must also consider the relative costs of transportation. Simply adding affordable housing in parts of the region that are not accessible to efficient public transportation may not reduce combined housing and transportation costs for households that find jobs and services farther away.

Metroscope Recommendations

The PSU team had several recommendations to Metro to improve the performance and usability of Metroscope.

Fragility of the Model

The Metroscope model relies upon the care, attention, and experience of a small team of researchers within Metro. We understand that they are trying to widen the pool of analysts who can work with this model, both by training and converting the software to an open source environment. This effort needs to be supported by Metro so that the performance of the model does not rely upon the presence of a few key individuals. Metro might create training programs

or scholarship programs to increase the familiarity with the Metroscope model of researchers at local universities, government agencies, and interest groups.

Transparency of the Model

Metroscope is a complex model, but that complexity is compounded by a heavy use of jargon that makes acceptance of the results of the model by policy makers more difficult. For example, analysts at Metro are comfortable describing the demographic "bins" in the model by their number, but those numbers (or the concepts of "bins") have no meaning to policy makers. For the purpose of this report, we have adopted name-tags for each bin that approximate the demographic group represented. We believe more use of ordinary English and less jargon in presentations will make the model more transparent to policy makers.

Policy Focus of the Model

Metroscope serves many purposes for Metro, including land use and transportation planning, where issues like the demographic nature of households or the wealth of households is less important than they are for formulation of housing policy. Metro staff needs to adapt the use of the model to match funding categories or demographic categories easily understood by policy makers. For example, Metro staff should be prepared to collapse data into demographic categories like "the elderly," for which specific housing programs and funds exist.

On the other hand, information on household wealth is hard to obtain. In that case, we would encourage staff and policy makers to focus on the needs of renter households, since they are likely to have less wealth and greater financial need than homeowner households of otherwise similar characteristics. For the longer term, Metro may want to consider new data collection techniques to learn more about the wealth of households.

Better information about the connection between housing and transportation costs would also provide richer information for planning affordable housing. Affordable housing that is remote from jobs and services and not well-served by public transportation may increases transportation costs and therefore not substantially change the amount of income used by households for both expenditure categories.

Usage of the Model

Metroscope is a powerful research tool that can answer many of the questions that policy makers have about housing needs and housing policy. However, staff and policy makers need to have ongoing conversations to learn from each other about the potential of the model (from the staff) and the sorts of questions that that are important (from the policy makers). This interaction might take the form of background reports or presentations by staff on housing topics as new data become available.

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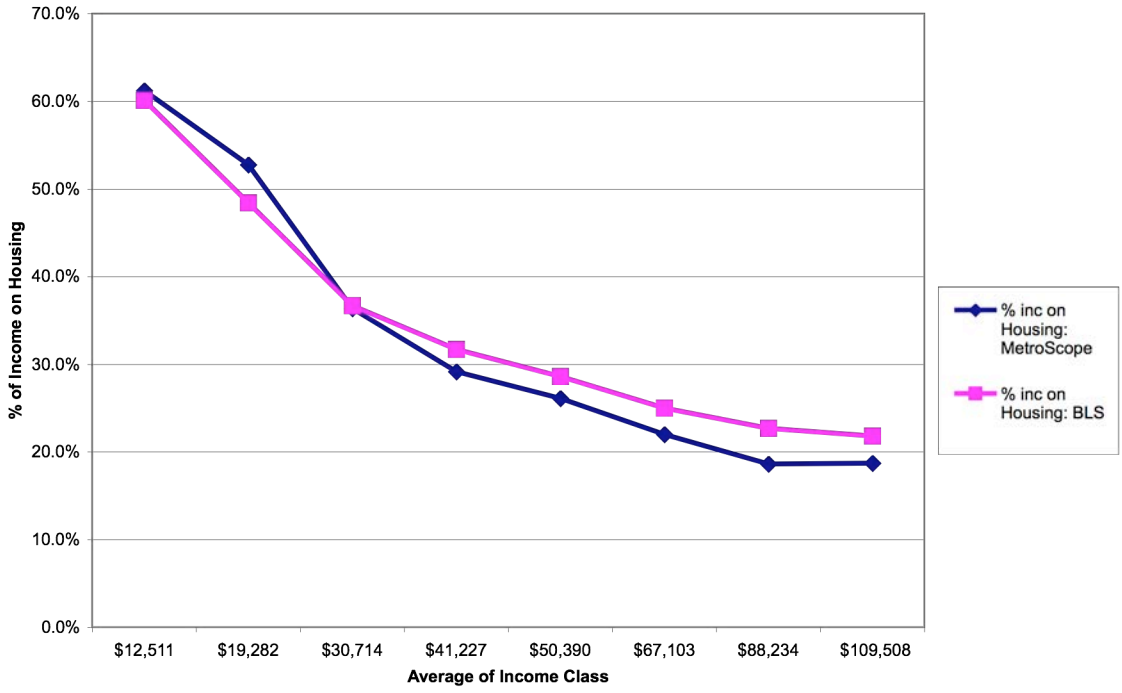
A Model Comparison

This appendix contains a memo dated August 29 describing PSU's comparison of the two models Metro asked us to consider for the Metro Affordable Housing Study.

Figure A-1 below demonstrates one of the reasons we chose the *Metroscope* model: its estimates of the percentage of income spent on housing approach estimates of the Bureau of Labor Statistics for 2005.

Figure A-1: MetroScope % of Income on Housing Compared to BLS Survey 2005



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MEMORANDUM

August 29, 2007

To: Gerry Uba, Metro

From: Sheila Martin
George Hough
Gerry Mildner
Risa Proehl

Re: Metro Affordable Housing Study, Model Comparison

Attached is a description of the two models that you have asked us to compare for the purposes of estimating the current and future affordable housing needs in the metropolitan region. The memo is divided into three five sections:

A. **Description of the Models and their assumptions**, summarizes the basic features and goals of each model.

B. **Model Inputs and Outputs,** compares the inputs required to run the two models and describes their outputs.

C. **Recommendations,** includes our recommendations regarding how to proceed with the analysis.

Metroscope and State Model Review

The purpose of the Metro Affordable Housing Need Study is to estimate current and future **affordable** housing **need**. Our initial task is to review two housing models that purport to forecast future housing need (the State Model and Metroscope), interpret how they run, and provide an easy to understand overview of how they each work. In addition, we are charged with recommending the use of either one of the models, or incorporating the use of both, in Metro's housing need study.

An overview and technical documentation of both models was provided to PSU staff to conduct the review. Note that neither model predicts the need for group quarters facilities or considers the homeless population.

A. Description of the Models and their Assumptions

State Model

The State Model was developed as a tool to use in planning for new affordable housing units in a specified area and has been adopted by a number of smaller communities within the state. The State Model forecasts the number of housing units that are needed at different price levels so that that no one in the forecasted population would be paying more than 30% of their income on housing costs. There are three models, one for each of type of study area: 1) urban, college or resort; 2) medium size rural; and 3) small rural. The State Model may be run for cities, counties, or larger regions for which data exist.

The State Model is comprised of a housing needs model and a land needs model. The two models are inter-related, but the housing needs model can be run without the land needs model. New housing is predicted from planned housing by density and zone. The number of affordable units needed by housing costs and tenure is predicted from the forecasted percentage of households by income and age of householder. The gap between the current supply and the future demand of affordable housing units is identified in the results. Land needs in the study area are also predicted based on the current inventory of housing and available buildable land in the area.

Future demand of housing units by price of housing and tenure, related to housing choice, in the State Model is influenced by household income, the age of the householder, tenure and the price of the home as reported in Census 2000, and by the propensity to reside in a home that has housing costs that are either higher or lower than what the household can afford (affordability factors called in and out factors). Other considerations that influence the demand for housing units in the State Model are assumed vacancy, demolitions of existing units, and subsidized housing.

There is no transportation component within the State Model, so that housing units could be located anywhere within the metropolitan area. As a result, the changing preferences of households as they age are met only by housing type, not the commuting pattern. There is also

no mechanism in the State Model for the housing stock to depreciate in value over time. And there is no mechanism within the State Model to forecast the production of housing by the private sector, based upon building costs, housing prices, and affordability. Instead, the housing that is produced is assumed to equal that allowed by zoning in the community. In that sense, the State Model is not really an economic model.

The State Model is a non-equilibrium model that might allow for significant housing shortages. The gap between housing prices and rents and production costs will not cause a spurt of housing development in the State Model.

Assumptions made when running the State Model include:

- Housing choice in the future is the same as in Census 2000.
- Housing choice is dependent on tenure and housing cost decisions made by households as reported in Census 2000 by age of householder, and household income.
- Price levels (housing costs of housing units) are calculated assuming that housing costs should take no more than 30% of the household's income.
- Ownership price levels are based on the following assumptions: 30 year mortgage at 80% of value, property taxes at $15 per thousand of value, homeowners insurance based on State Farm Insurance rates, and the Mortgage Bankers Association recommended 28% ratio of housing expenses-to-income excluding utilities. The average historical interest rate of 8.1% was used to arrive at a third ownership price range.
- Number of subsidized housing units which affect price levels is adjustable.
- Vacancy rate (to convert units in households) is adjustable.
- The definition of income is the Census 2000 definition of Household Income – usual annual income of all household members.
- Mortgage costs: different scenarios to choose from – high, low, historical – may be changed.

Metroscope

Metro's model was developed for land use and transportation policy evaluation for the Portland-Vancouver metropolitan region; it has other uses such as transportation planning and Urban Growth Boundary (UGB) analysis. The model's output provides a forecast of where and how much housing will exist in the future. The geographic level for which the output is generated is in Metro defined regions. The whole of the Portland-Vancouver metropolitan area consists of 20 Sub-county Area Districts (Clackamas, Multnomah, and Washington Counties, Oregon and

Clark County, Washington). Each District's boundaries follow census tract boundaries and each was designed to represent its fair share of specified population and housing composition in the Portland-Vancouver area.

Metroscope is comprised of 4 inter-related models:

economic (forecasts region-wide population and employment);

location (comprised of residential and non-residential sub-models) that predicts where and how much housing will exist in the future based on predictions of how much and where employment activity will occur, the price of housing (incorporates the costs of development, locational amenities, and depreciation in value), household income and other wealth factors, and the age of householder;

travel (estimates trip origins and destinations, and measures perceived cost of travel between regions which affects where people work and decide to reside); and

GIS/land tools and database (aka the Land Filter which monitors current residential development, and tracks where and how much land [parcels] will be available for development in the future, provides an inventory and accounting of developable land that is available, and its capacity for housing units and employment). All sub-models are interrelated, and they influence and provide inputs for one another.

For our purposes, the results of Metroscope are the future number of households by housing type (single-family, multi-family) and tenure, price levels, age of householder, income level, percent of income spent on housing costs, tenure, and household size reorganized into bin categories. The results are produced by location (district). Metroscope also produces non-residential results such as the location of commercial property and commuting patterns, which can be used for other planning purposes.

The housing supply/demand results of Metroscope is dependant on the region's forecast population, land capacity/amount of developable land available, housing choice (influenced by tenure, age of householder, household income, housing costs, household size), and location choice (influenced by availability of housing, neighborhood attraction, distance to available employment opportunities of householder, and the Census 2000 household, income, age structure).

Metroscope is an equilibrium type of model, that balances housing demand and housing supply by adjusting vacancy rates, prices, rents, and production. Because of this model structure, housing prices and rents are bounded by household incomes to some extent, and housing production is determined partly by land use and zoning policies and by the interaction of rents, prices, and construction costs.

Assumptions made when running the Metroscope model:

- Housing choice in the baseline estimate is dependent on tenure and housing cost decisions made by households as reported in Census 2000 by age of householder, size of household, and income – values of housing choice variables/measures may be adjusted.

- Housing costs for homeowners assumes a 30 year mortgage with a 20% down payment.

- Housing price is affected by depreciation and may be adjusted.

- There is a one-to-one relationship between households and housing units (assumes constant vacancy rate).

- Income is defined by the total personal income definition developed by the BEA. It includes wages & salary disbursements, dividends, interest, rent, other labor income, proprietor's income, and transfer payments less social insurance contributions Personal income is then divided into income ranges based on Census 2000 income categories, which there are 16. Metroscope combines several of these categories and only operates with 8 income categories.

- Income increases by 1% per year in inflation-adjusted terms and may be adjusted by the user.

- Age of householder has a certain amount of effect on wealth.

B. A summary of the Inputs and Outputs of both housing forecast models are presented in the tables below:

Current Supply of Housing (Current Housing Inventory)

	MetroScope	**State Model**
Model Inputs	Data from Land Filter, tax assessor data; vacant developable parcels, parcels for redevelopment, and parcels that can be sub-divided for infill (already in model).	Data from Census 2000 housing stock and inventory if 2000 is used as base year; if other year is used as a base, then tax assessor data and rental survey (to be conducted by user of model).
Initial Model Conditions	The number of Households by size, income, age, and tenure, as well as location within the metropolitan area.	The number of Households by income, age, and tenure

Current Demand for Housing

	MetroScope	**State Model**
Model Inputs	Current population and employment (already in model)	current total population, group quarters population, persons per household, number of housing demolitions, number of vacant units,
	Housing occupancy by tenure and cost by age of householder and income level (already in model)	Housing choice by tenure and cost by age of householder and income level (already in model)
		Percentage of households by age of householder and income.
Initial Model Conditions	The number of Households by tenure, income, age, price levels, as well as location within the metropolitan area.	The number of Households by tenure, income, age, price levels

Future Supply of Housing (Future Housing Inventory)

	MetroScope	State Model
Model Inputs	From Land Filter; known to model: amount of land and zoning; land filter acts as market supply	UGB Acreage, acres in use and acres constrained.
		Planned housing units; predicted percentage of household by age of householder and household income
Model Outputs	Where and how much land and which parcels will be made available for development in the future (from residential location model) Using the Land Filter model, housing is supplied as prices exceed production costs. Users of the model may influence housing production through development subsidies, zoning changes, or changes to land supply policy.	Buildable land inventory (without information on likely location within metropolitan area). Housing is assumed to be built as planned, rather than by market profitability.
	The number of Households by household size, tenure, income, age of householder, and price levels , distributed among census tracts or other geographic areas.	
	Price indices in residential location model are iterated and adusted until # of housing units in demand equals # of units in supply in each of several categories or "bins", which are distinguished by tenure, housing type, income, age, and the presence of children	Demand is an output

Future Demand for Housing

	MetroScope	State Model
Model Inputs	Population forecast from economic model input to residential location model.	Forecast of total population, forecast group quarters population, predicted PPH, predicted demolitions.
		Vacancy rate known to model
		Household distribution by age of Householder, and income
		In and out factors (built-in)
		# of Housing vouchers
Model Outputs	Number of households by type, tenure, price level and percent of income spent on housing costs. Households are modeled to change their housing demand between rental and ownership and between single and multi-family property as their income, age, and household composition changes. Overall housing supply and demand are equilibrated in the model, by adjusting the price of each housing type, as well as its vacancy rate.	Number of affordable units by price levels and tenure.

C. Recommendations

1. We recommend the Metroscope model for the affordable housing need analysis. We believe that Metroscope has a more realistic model of housing development that incorporates the impact of household choice, development economics, and commuting preferences. These features are absent from the State Model.
2. We recommend that Metro officials learn about the questions that they can pose before the economists and demographers at Metro who manage their model. Metroscope integrates the residential housing model with transportation, land use, and commercial location models, and therefore provides a fuller and more realistic understanding of what housing will be supplied in particular areas given transportation infrastructure investments, land supply restrictions, and household preferences for community and housing costs. For example, Metroscope can be used to determine the neighborhoods which can accommodate children or senior citizens or identify where housing is needed to accommodate those types of households. Since one of

Metro's goals is to influence land use policy to accommodate future population growth, Metroscope seems ideally suited for this kind of analysis.

3. We feel that the analysis of affordable housing needs should be focused on the rental housing market, rather than the ownership housing market. None of the data available has a good measure of the amount of household wealth available to purchase a home. For example, one households can find a $400,000 house affordable, whereas another household does not, based upon their accumulated wealth. And since we know that lower income households are more likely to be renters, focus should start there.
4. Since Metroscope equilibrates demand and supply, it does not define a "housing affordability gap" per se. However, the gap can be defined as households spending an unacceptable percentage of their income on housing. We plan to decompose this gap by different HIA groups to provide a more in-depth understanding of the need. This more in-depth analysis will provide Metro a more complete understanding of the impact of policy.
5. We suggest extensive sensitivity analysis on the variables that drive the results of the model. We will work with the Metroscope analysts to acquire the data runs necessary for this analysis.
6. We recommend that Metro invest additional resources to support the operation of the Metroscope model. Currently, there are a limited number of Metro staff who are capable of operating the model and interpreting its results. While we believe that Metro should use this model for housing analysis, land needs analysis, and transportation analysis, we are concerned that the limited number of trained staff makes that reliance fragile.